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The Drainage of the Haarlem Lake, in Holland.

WE have the pleasure of laying before our readers a description of the "Lynden," one of the three pumping-engines, of equal size, now used to keep the Haarlem Lake of Holland dry. These engines are the largest in the world. Before giving the description, we will say a few words of the peculiar work for which the ponderous machinery was built.

Haarlem Lake, lying in the heart of Holland, between the great cities of Amsterdam, Leyden, and Haarlem, was the scene of a busy inland commerce; but the facilities which it offered in this respect were counterbalanced by serious inconveniences. The lake having a surface of nearly 50,000 acres, while its bottom was only some seventeen feet below tide-water, was tossed by winds into short, "chopping" seas, most dangerous to navigation. The agitated waves were also constantly encroaching upon its shores, now on one side, now on the other. Under these circumstances, the necessity of removing this inland sheet of water became more and more evident. It was proposed, even two hundred years ago, by the Dutch engineer LEEGHWATER, and afterward by CRUQUIUS and Count Von LYNDEN; and when, in 1842, it was resolved to pump the lake dry, three steam pumping-engines were commenced, and named "Leeghwater," "Cruquius," and "Lynden," after the three celebrated men who had at different times presented plans for the accomplishment of this vast work.

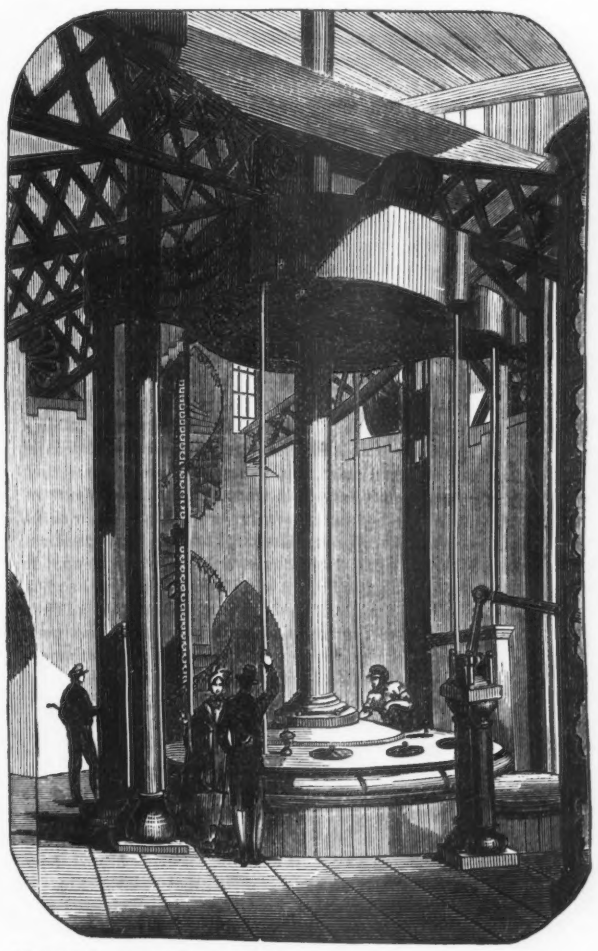
The lake was surrounded by land, not higher than its own basin, but of which the water, by means of pumping wind-mills, after the old Dutch fashion, was thrown into the lake. This was itself surrounded by levees, called dikes in Holland, and provided near the city of Amsterdam, with locks, the doors of which opened toward the outside, and give exit at low tide to the water, but closed automatically when the ocean tide rose. In this way, the surface of the lake was kept a little above low tide-water.

The first thing done, preparatory to drainage, was the excavation of a wide canal, circumventing the lake entirely, for the triple purpose of providing for the navigation which formerly went over the lake, giving exit to the water formerly thrown into the lake by the numerous wind-mills employed for the drainage of the surrounding land, and, finally, receiving the water of the lake itself. It was also found necessary to provide an additional exit for the contents of this canal, the volume of which would become immensely increased as soon as the pumping-engines commenced to throw the lake-water into it. For this purpose, the old mouths of the river Rhine, which had become filled up with sand centuries before, were re-opened and provided with large locks, a work only second in magnitude to the digging of the entrance of the Suez canal from the Mediterranean sea. The cause of this filling up of the mouths of the Rhine was, that the river, in repeated inundations at different times, had broken through the dikes or levees which confined it, and made three new channels, one connection through the river Meuse, one through the river Leck, and one entirely new outlet, the Yssel, by which a portion of its water passed into the Zuyder-Zee. The drainage of the latter is now contemplated, and will involve the complete closing of this mouth of the Rhine. That this will be accomplished admits of no doubt. It must be considered that the Hollanders are acknowledged to be the greatest hydraulic engineers in the world. They commenced the first drainage of a lake in 1440, and continued this labor during the war of independence against Spain, fighting at the same time for their lands against the ocean and against tyranny, till they founded, in the midst of monarchical governments, the republic of the United Netherlands. During the four centuries that have since elapsed, the number of lakes, large and small, drained in Holland, amounts to over one hundred, and one million people now live on the grounds thus reclaimed, which are blooming like gardens in the highest conceivable state of cultivation.

Calculations in regard to the required capacity of the engines for the drainage of the Haarlem Lake showed that, after the lake should have been pumped dry, the rainfall of a surface of over 100,000 acres would have to be constantly removed. There were 50,000 acres draining their surplus water into the lake by means of three hundred wind-mills. There are, by the way, 12,000 wind-mills in constant use in Holland at the present day, for the simple purpose of drainage. They are almost all of colossal size, each lifting from ten million to fifty million gallons of water every twenty-four hours.

There exists still a diversity of opinion among the engineers of Holland whether, in the drainage of the Haarlem Lake, it would not have been more economical to depend chiefly upon numerous wind-mills, and to maintain only one large steam-engine as reserve, to give assistance in the rare contingency of a deficiency of wind, combined with excess of rain. However that may be, the plan of depending, in this case, on steam-power alone, prevailed; and it was decided to have three steam pumping-engines built, of 500 horse-power each, and hence capable of lifting one thousand million gallons ten feet high in every twenty-four hours.

There existed at that time (1842) only one foundry in the world—an English establishment—where the cylinders required could be cast. They have an interior diameter of twelve feet, with ten feet stroke. The "Leeghwater" was the first engine built. It drives eleven pumps of sixty-three inches diameter each, all moving at the same time, and attached to the upper part of the piston rod by means of eleven large walking-beams. For this purpose the huge cylinder is placed in the centre of a



VIEW OF THE SECOND STORY OF THE CYLINDER-HOUSE OF THE HAARLEM LAKE PUMPING-ENGINE.

circular building or tower of heavy masonry, standing in the lake, near the shore. This tower has twelve equidistant openings at the sides, eleven serving for the fulcrums of the walking-beams and one as a doorway. Half of each walking-beam projects out of the tower into the open air, so that they radiate outward from the circular tower. To the outer extremity of each walking-beam is attached a pump-rod. The pump-cylinders surround the tower; their lower parts are of course plunged in the water of the lake, their upper ends are about at low-tide level, and are all connected with a floor, at the same height, so that when the cylinders overflow at the upward stroke of the piston, the water covers this floor, and by a proper lock is guided into the canal surrounding the lake.

It is easily to be seen that the upward stroke of the piston in the steam-cylinder causes the pump-pistons to descend, and that only its downward stroke lifts the water. Keeping this in mind, the chief problem was to use the steam in the most economical manner. Before these engines were built, there were only five small steam-pumps running in the Netherlands, of 30 horse-power each; but their average consumption was 20 lbs. of coal per horse-power per hour; and even in England, where also steam had been substituted for wind in the drainage of a few fens or marshes, the consumption of coal was nearly as great. But it was determined in Holland that in the new engines the consumption of coal should not be greater than two and a-half lbs. per horse-power per hour; and this was attained in the following manner:

The steam-cylinder is double; there are, in fact, two cylinders, one annular, twelve feet in diameter, and one inside of this, seven feet in diameter. Both are secured to one bottom, and covered by one top; but the inner cylinder does not touch the cover by one and a-half inches. There are two pistons, twenty-six inches deep; the outer piston is annular, and has a packing on both sides. Beneath this annular piston a vacuum is maintained when working. It has four piston-rods, connected with the central piston-rod of the inside piston, which is of the usual kind. Thus five piston-rods are attached to a large, heavy cross-head or cap, the whole mass weighing about eighty-five tons; and by eleven connecting-rods the cap is suspended from the inner ends of eleven cast-iron balance-beams, to the outer ends of which are hung the eleven pump-pistons. The illustration herewith presented shows the interior of the second story of the cylinder house of the "Lynden," which, as we have remarked, drives only eight pumps. There are, therefore, only eight balance-beams. The action of the engines is simple; the steam being applied under the inner piston, lifts both the pistons, great cross-heads, and inner ends of pump balance-beams simultaneously, and the pump-pistons descend at the same time; by a hydraulic apparatus attached to the great cross-head, the dead weight of the pistons, etc., is arrested at the point to which it had been thrown up by the steam, and time is given for the valves of the pump-pistons to close before the down-stroke of the steam-pistons is made; then, the equilibrium-valve being opened, the hydraulic apparatus is liberated at the same moment, and the steam passing from beneath the small piston, above both pistons, the pressure on both sides of the small one is equalized, while nearly two-thirds of the steam acts upon the annular piston against a vacuum, and in aid of the dead weight helps to make the down-stroke in the steam-cylinder and the up-stroke in the pumps. The use of the two cylinders enables the engine man, by judiciously altering the expansion in the small cylinder, to command his work at all times, without stopping the engine to take out or put in dead weight, as would be necessary for a single-acting, one-cylinder engine, where dead weight only is used for lifting the water. It has frequently occurred that the load of an engine has been added to or diminished by ten or twelve tons in the course of half an hour, by the action of gales of wind on the surface of the lake. Each engine has two air pumps of forty inches diameter and five feet stroke. The steam is cut off in the small cylinder at from one-fourth to two-thirds of the stroke, according to the load; and after expanding through the remainder of the stroke, it is still further expanded in the large cylinder. The anticipated economy in consumption of fuel has been realized: when working with the net power of 350 horses, the average consumption is 2¼ pounds of best Welsh coals, or 75 millions duty with 94 pounds of coal; and on a late trial, the "Cruquius" and "Lynden" engines were found to do a duty of 87 millions. To compensate the district of Rhineland for the loss of 45,230 acres of the boezem or catch-water basin, a steam engine of 200 horse-power, driving ten large scoop-wheels, has been erected at Sparndam, to lift the water over the tide in the Y, or base of the Zuyder-Zee, where the rise is, on an average, only seventeen inches. The engine has discharged 30,000,000 tons of water in fifteen consecutive days. When the state of the lake permits the "Leeghwater," "Cruquius," and "Lynden" engines to work freely, they discharge, on an average, 2,000,000 tons in twenty-four hours, and they are capable of doing this down to their full depth. In the month of June, 1849, the three engines discharged 60,000,000 tons of water, and lowered the lake one foot; between the 1st of May and 1st of December, they had lowered the lake five feet, and by the autumn of 1850, dry land appeared.

The "Leeghwater," "Cruquius," and "Lynden" engines were contracted for jointly by the Hayle and Perran Foundry Companies, Cornwall, and were manufactured and erected under an able director.

The writer of this article was present at the trial of the first engine built, the "Leeghwater," in 1846, and remembers vividly the striking action of its huge cylinder, which lifts rapidly the enormous weight supported by five piston-rods, in little more than a single second, through a distance of ten feet; the eleven walking-beams moving at the same time and the pump-pistons descending. Then it rests for one or two

seconds, and by the admission of the steam above the piston from below, and by virtue of the vacuum under the exterior annular piston, the steam piston-rod starts slowly down with accelerated motion, while the eleven pump-pistons, each over five feet in diameter, majestically rise and bring up eleven columns of water, which overflow the floor and find exit at the locks. We describe this specialty, as it was the opinion of many hydraulic engineers that, notwithstanding the excellence of the steam engine, great mechanical loss is sustained through the necessity of overcoming the momentum of such large masses. The enormous body of water flowing below toward the pumps comes to perfect rest after every stroke ; and, moreover, the counterpoise, at least equal to half the weight of the water lifted, has to be put in motion alternately, besides the weights of the piston itself. Of course the latter is unavoidable ; but it was argued that there is a natural advantage and economy in a constant stream of water, and a great disadvantage in these spasmodic discharges every fifteen or twenty seconds, and that if steam and not wind were employed, wheels, either on the paddle-wheel or turbine principle, would be more economical. No engineer now-a-days would object to the principle of employing a counterpoise, which is known as the Cornish plan ; but the supposed disadvantage of the agitation of the water is better founded in fact. Yet, as a whole, the economy of these engines will be scarcely surpassed by any other approaching them in size.

The greatness of this undertaking becomes still more striking if we take into consideration that the average level of the lake was five feet below high-water in the North Sea, and that, having a depth of fourteen to seventeen feet, it contained (including the additional quantity of rain and infiltration during draining) not less than 200,000,000,000 gallons.

The greatest quantity of monthly drainage, since the lake was pumped out, has been 1,000,000,000 gallons ; and the average annual surplus of rain water, etc., 1,500,000,000 gallons, to be lifted, on an average, sixteen feet.

The original appropriation made for the drainage by the States-General of the Netherlands, was ten million florins, or four million dollars in gold, and the expenses conformed with remarkable closeness to this estimate. As nearly fifty thousand acres were reclaimed, this makes only an original cost of forty dollars per acre for land as productive as any on the globe. Additional expenses for the construction of roads, ditches, etc., increased the cost to about fifty dollars per acre. The land is now worth many times that amount. Several villages dot the shallow valley, in the centre of which is a little low hill or eminence, formerly an island in the lake.

Polytechnic Club of the American Institute.

Meeting held at the Rooms of the Association, February 17, 1870, Prof. S. D. TILLMAN in the Chair.

BEFORE the regular subjects for the evening were taken up, a new form for parallel rulers was presented by Mr. BLANCHARD, and a rule constructed in accordance with it shown. It was not patented and the gentleman did not intend to patent it, nor to manufacture the article for sale. The chief features of the invention were two rules united at one end by a joint which allowed them to open and shut, and another rule against which one of the joined rules moved. One of the "legs" of the first pair was notched and a pawl on the fixed rule enables the pair to be moved along one notch after each line has been drawn. The angle to which the jointed pair are opened determines the distance between the parallels drawn. The whole arrangement works on the plan of the ordinary ruler and triangle, and is, in fact, a ruler with skeleton triangle of adjustible angles attached.

Mr. WHITNEY then explained Mr. BOGARDUS' apparatus for taking soundings without a line. It consists of a weight to carry the apparatus to the bottom, a frame, in which a revolving screw and suitable clock-work indicate the depth to which the instrument descends, and a hollow float, which serves to bring the recording apparatus to the surface, after the bottom has been reached and the weight detached by an automatic disconnecting attachment. The apparatus for measuring the distance is simply a screw, like the propeller used in steamers, attached to which is a counting apparatus for registering the number of turns made. The index in the instrument will go as high as ten thousand yards, which, it was remarked, is probably as great a distance as would ever be necessary. The weight is so arranged that it is instantly disconnected upon touching the bottom, when the float at once takes the instrument toward the surface, the screw revolving in the opposite direction, but having no influence upon the index. The ability of a float to resist the pressure at great depths, the accuracy of the measurements, and whether the apparatus could be found after its return to the surface, were points discussed with some interest. In regard to accuracy, it was said that the instrument had been tested at various depths, and gave readings which were proved correct by the sounding line ; it was therefore probable that it would be accurate for all depths. The speaker remarked, that at great depths a number of the instruments would be used, and if many never were found, it would be less expensive than the present mode of using a line. Several gentlemen then pointed out the resemblance which this instrument bears to Captain TROWBRIDGE's patent log for finding a vessel's speed. That instrument has been used for sounding, but always with a line attached.

Professor TILLMAN read some interesting items of foreign scientific news, which were discussed at length. We propose next week to give them, together with some of the remarks made upon them at this meeting. Among the more prominent were, "Heat from the Stars," "Petroleum as a Remedial Agent in Ointments," "A New Thermo-electric Pile," "The Potato Disease," "Chloral as an Anæsthetic Agent," "Boiler Setting," etc.

A sharp discussion took place among some of the medical gentlemen present, when items concerning surgery and a new food for infants were presented.

Mr. R. B. STEVENS discussed the "Growth of the South American Continent," a subject which he will continue at the next meeting, and which we shall then present to our readers in a condensed form.

On the Elevation and Subsidence of Continents.

Read and illustrated with various charts before the New York Liberal Club, by ADOLPH OTT, PH. D.

WITH the advance of science that treats of the changes in the materials of our earth's crust, it has become clear that certain portions of the globe have been alternately covered by the sea, then lifted from it as dry land, then again covered by the sea, and finally have again appeared as habitable land. It is furthermore ascertained that these areas remained in each of these states for considerable lengths of time. This became known by the stratified arrangement of rocks, by the rounded form of pebbles, and by the occurrence of fossil organic bodies, so abundantly distributed in all stratified formations of the globe. They occur at all heights above the ocean, having been observed, according to LYELL, at elevations of more than eight thousand feet in the Pyrenees, ten thousand in the Alps, thirteen thousand in the Andes, and above eighteen thousand in the Himalaya.

FORMER THEORIES OF THE REVOLUTIONS ON THE SURFACE OF THE GLOBE.

The earlier geologists, if we may call them so, were exceedingly bold in their hypotheses. They imagined that the anterior world had been entirely different from the present, actually observed creation ; that it was governed by other laws ; in short, that it was a world for itself. Now and then, we hear from laymen that the fossil remains, such as shells, teeth and scales of fishes and bones of quadrupeds are the proofs of the flood, as related in Genesis. Although this view has long been rejected, there is at least some reason in it, while the theories of some naturalists of the eighteenth century are too romantic to be discussed. I abstract the following facts in reference to these latter from CUVIER'S "Theory of the Earth :"

SCHEUCHZER (1702) thought that God elevated the mountains so that the waters of the deluge might run off, and accordingly selected those portions which contained the greatest abundance of rocks, without which, in his opinion, they could not have supported themselves. WHISTON (1708) started the idea that the earth was created from the atmosphere of one comet, and that it was inundated by the tail of another. The heat which was produced by the passage of the first comet, according to him, excited the whole antediluvian population, men and animals, to sin, for which they were all drowned in the flood, except the fishes, whose passions were apparently less violent. DEMAILLET imagined that the globe had been covered with water for many thousand years. He supposed that this water gradually retired ; that all the terrestrial animals were originally inhabitants of the sea, and that man himself began his career as a fish, asserting furthermore that it is not uncommon, even now, that fishes in the ocean are met with which are still only half man, but the descendants of which will in time become perfect human beings. Other naturalists accepted the ideas of KEPLER, and like that great astronomer, looked upon this globe as a huge living being. It contains, according to these, a circulating vital fluid, and is possessed of the faculty of assimilation. Every part of it is alive. It possesses instinct and volition, even to the most simple of its molecules, which attract and repel each other according to sympathies and antipathies. Every kind of solid part of the earth is capable of converting itself into "its own peculiar nature," (?) as we convert our aliment into flesh and blood. The mountains are the respiratory organs of the globe, and the schists its organs of sensation. By the latter it decomposes the waters of the sea, in order to produce volcanic eruptions. The rocky veins are *caries* or abscesses of the mineral kingdom, and the metals products of rottenness and disease, which explains why most of them, on being heated, have so bad a smell. Others, again, fancied that the water of the globe was divided among a multitude of successive lakes, placed above and behind each other, like the benches of an amphitheatre, and that these, after having deposited our fossiliferous strata, have successively broken their dikes to descend and fill the basin of the ocean. Let me mention yet a theory of BERTRAND, put forward in 1799. According to him, the globe is hollow, and contains in its cavity a nucleus of loadstone, which is dragged from one pole of the earth to the other by the attraction of comets, changing thus the centre of gravity, and consequently hurrying the great body of the ocean along with it, so as alternately to inundate the two hemispheres. In allusion to these fanciful theories, the English geologist, PLAYFAIR, declared that their originators were as fond of changes of scene on the face of the globe, as were the populace at a play. "Every one of them destroys and renovates the earth after his own fashion, as DESCARTES framed it ; for philosophers put themselves without ceremony in the place of God, and think to create a universe with a word."

MODERN VIEWS ON THE FOREGOING SUBJECT—LOWERING OF THE OCEAN BED—FUTURE GAIN IN LAND.

In the present century, there were still geologists who supposed the ocean to have originally been universal, and to have gradually sunk down to its present level, so that islands and continents were formed. They considered it more probable that the waters had become depressed, than that the land had been uplifted. However, those who made this subject a special study were at last compelled to conclude that the more solid land had repeatedly been moved upwards and downwards, so as to constantly change its position relating to the sea. Scientists draw this conclusion, not only because the facts presented remain in harmony with the law of nature, but also because such changes as those referred to have occurred in our own days, and are now in actual progress. It is thus seen that the same manner of reasoning is adopted by the geologist as well as the historian, who endeavors to explain past events in political history by those going on under his very eyes. As regards the distribution of water and land on our globe, geology teaches us that the globe was originally entirely covered with water ; but slowly land began to rise, first only forming islands. Gradually, however—perhaps millions of years after—continents began to make their appearance. It is satisfactorily proven that during the most ancient fossiliferous rocks, there were no large continents with well-developed river systems, but the surface of the globe presented but one large archipelago. In the course of time the ocean bed became deeper and deeper, while the land was simultaneously upheaved. The raising of mountains, according to DANA, reached its climax in the Tertiary period ; but, as most land experiences now a slow upheaving movement, while comparatively small portions only are subsiding, a future gain in land must necessarily be the consequence. There exist decisive proofs that the submerged shores of a number of islands in the Southern Pacific are slowly rising. As a transportation of rocks by icebergs is known to be in progress in the southern hemisphere, similar to that in the northern one, the stones being deposited when the icebergs get melted, chains of erratics will be seen upon the exposed portions of dry land at some distant day, such as are now observed in the Alps, in North Germany, and in America.

THE FACTOR, TIME, IN GEOLOGY, AND THE PERIODS OF GEOLOGISTS.

The geologists at the close of the last century, CUVIER at their head, held the belief that the changes on the earth's surface and in its interior had mostly taken place suddenly. Now, the bottom of the sea was instantaneously elevated, so as to submerge the loftiest summits of mountains ; now enormous rocks, by some awful cataclysm, were hurled from Labrador into the very heart of America, or they were carried along by a "petridelaunic," or cobble-stone flood, that remained unaccountable as to its origin, course and end. It was Sir CHARLES LYELL who, in his "Principles of Geology," in 1833, put a stop to these ideas. He clearly set forth, that by the introduction of the simple factor, time, we may readily account for the history of the globe. As ARCHIMEDES exclaimed, "Give me a fulcrum, and I will move the earth," so said LYELL, "Give me time, and I will explain geology." Since the knowledge of the successive upheavals of the coast of Chili, of which three or four have taken place in the last fifty years, it has been calculated that ten thousand such uplifts are sufficient to form a mountain chain of the height of the Himalaya ; and where the ocean now deposits one inch of sand or mud per year, there will be a stratum of 1,000 feet in 12,000 years. We conclude this from phenomena now in progress upon the period of time necessary for the accomplishment of observed results of analogous kinds. BROWN, the zealous and careful investigator of antediluvian statistics, shows, in his "History of Nature," that a complete change of organic species has taken place on the earth about thirty times, not suddenly, but gradually ; so that as many eras may be determined, different from each other in living species. LYELL and others, on the ground of geographical changes attended by the production of fluviatile formations, have estimated that 1-1000 of the existing organic species will die out in 50,000 years, and be replaced by new ones. From this it would follow, that for one complete change of species, 50,000,000 years, and for thirty successive changes 1,500,000,000 years are required. Other computations lead to still larger numbers. This gives us an insight into the antiquity of the globe, revealing at the same time the fact that the world is not only infinite in regard to space, but also in regard to time. The poet COWPER, in his "Garden," confounding, as many others have done, the Bible with his interpretation of it, exclaims :

> "Some drill and bore
> The solid earth, and from the strata there
> Extract a register, by which we learn
> That HE who made it, and revealed its date
> To MOSES, was mistaken in its age."

UPHEAVALS OF LAND IN THE NORTH OF EUROPE—SWEDEN, SIBERIA, AND DENMARK, RISING FROM THE SEA.

The movements of land, whether of elevation or depression, may be accompanied by earthquakes or accomplished slowly by the century. The latter are called secular, the former paroxysmal, movements. Although this globe, by virtue of the many safety-valves which we call volcanoes, has now reached a state of comparative stability, such changes of level in the land still take place ; but while sudden upheavals and depressions are generally confined to small tracts of ground, secular dislocations of the earth's crust extend generally over large portions of the globe. We shall treat of the latter only, and, in particular, confine ourselves to those which have taken place during the age of man, and most of which are now in actual progress.

The study of these phenomena began with the changes of level observed on the shores of Sweden. CELSIUS, as early as 1743, declared his belief that the level of the gulf of Bothnia was sinking in that century about forty-five inches. He, as well as LINNÆUS, attributed the change to a real diminution of the waters of the Baltic. This theory found its first antagonist in PLAYFAIR, who, in his "Illustrations of the Huttonian Theory of the Earth," (1802), started the idea that it was more likely that the land had experienced a gradual upheaval ; since a subsidence of the Baltic, as he claimed, would necessarily require a uniform sinking of the whole ocean, and also because the hypothesis of the upheaval of the land was in harmony with HUTTON'S theory, according to which continents were not only raised, but also maintained in their position by subterraneous expansive forces. In 1807, VON BUCH, a distinguished Ger-

man geologist, after having travelled through Scandinavia, also announced his conviction that a rising of the land was in progress, which extended itself from Frederickshall to Abo, and perhaps to St. Petersburg. Since then the attention of naturalists all over the world has been directed to this curious class of phenomena. The Government of Sweden itself took active steps in order to follow up the cause of the change. It had markings cut in the rocks along the shores, indicating the height of water, by which, after an examination in the years 1820 and 1821, on the part of the Swedish Academy of Sciences, new proofs were added in behalf of a continued change of level. But, in spite of all these confirmations, the phenomenon of a secular, insensibly-continuing upheaval of such a great area, seemed to indicate so grand and remarkable action of subterranean forces, that LYELL, who still entertained some doubts, in 1834 undertook a voyage to Sweden, in order to subject the matter to a new and general examination. The result of this inquiry afforded a brilliant confirmation of the view of VON BUCH. According to LYELL, the elevation amounts to three feet in a century—a figure also ascertained by Swedish naturalists. It appears, moreover, that the Swedish shores of the Baltic have experienced a subsidence of sixty-four feet since their inhabitation by man, and before the elevation now in progress; the latter, therefore, if it has been uniformly three feet per century, must have commenced 2,000 years ago.

The importance of the subject may justify the mention of some details from LYELL's report. Southwest from Stockholm he found a large number of the shells of *Mytilus edulis* imbedded in a stratum of clay ninety feet above the sea. This mollusk is still living in the Baltic. In one of these beds the remains of a boat, an anchor, and nails, were discovered. At another spot, at a depth of sixty-four feet, a fishing-hut was struck; on its floor there was a fire-place, with pieces of wood and charcoal. The hut stood in a firm stratum of sand, the over-lying deposit included shells, of which all the species still crowd the northern shores, giving undoubted evidence that it must have been formed by the waters.

It follows from this remarkable occurrence that the adjoining land, after the erection of this hut, must have experienced a downward movement, until it reached a depth of sixty-four feet below the sea, and that it was gradually covered with an equally thick strata of alluvial deposits before the bottom of the sea began to rise again. Again, it appears from these relics that the Scandinavian peninsula, since man commenced to build ships and to forge iron, must have undergone considerably greater dislocations than could ever be supposed from historical and traditional accounts.

What has been established for the eastern borders of the peninsula has been confirmed for the western shores, or those of the North Sea. VON BUCH, in the beginning of this century, discovered, north of Drontheim, and at the height of 400, 500, and 600 feet, schists of blue clay, including *testaceæ*, the same species of which still inhabit the northern seas. It appears furthermore that these elevations had not gone on continuously, but were interrupted. There were pauses in the upward movement. This is shown by the so-called terraces of denudation.

Northern Russia seems also to have been submerged within comparatively recent times. MURCHISON and KEYSERLING discovered three old marine deposits extending two hundred and fifty wersts inland from the Arctic coast; and at the influx of the river Waga into the Dwina, one hundred and fifty feet above the level of the sea, beds of sand and clay with innumerable *conchyliæ* were discovered, which had not yet become bleached by the action of time. They were recognized as identical with still living species. From other observations, it follows that Northern Siberia was uplifted, when the mammoth and the rhinoceros lived further southward; and it may also be mentioned that the *northern* part of Denmark is partaking of a tranquil elevation.

SUBSIDENCE OF THE LAND AND OF THE BOTTOM OF THE SEA.

That large portions of land are now experiencing a slow downward movement, has so well been ascertained that it cannot be doubted any more. And, as those movements sometimes take place in regions bordering on tracts of land in progress of elevation, they furnish the very best proofs against the theory by which the rising of land is explained by a lowering of the sea. For how could it be possible that the same ocean, by the alleged lowering of its level, could have effected a rising of a portion of land simultaneously with a lowering of an adjacent portion? To accept this would be equivalent to a denial of all laws of hydrostatic equilibrium. The proofs of a land subsidence are best ascertained at the coasts of the respective countries, particularly where the average height of water presents a nearly unchangeable level. While elevations are discovered from the *emerged* products of the sea, depressions are brought to light by the *submerged* remains of plants and the products of man. If, for instance, oak and beech forests, or remains of walls and levels are met with, deep below the level of the sea, we may safely conclude upon a sinking of the respective shores. But there are other not less conclusive signs, by which a lowering of the ocean's flow may be ascertained. These are the various reef-building zoöphytes, that are bound to certain depths, within which they flourish, but beyond which they are unable to live. Most coral-building polyps, according to EHRENBERG, DARWIN, and DANA, are confined to a relatively small depth, mostly to that of twenty fathoms. If, therefore, we meet in the ocean with many and extensive reefs, that descend a thousand feet and more, we may with the same right conclude upon a sinking of the bed of the sea, as we may infer an elevation when the reefs have emerged from the level of the sea. It is upon this argument that the great English philosopher and naturalist whose name is also inseparable from a new theory of species, has founded his ingenious and grand view of the secular depression of widely extended areas of the South Sea.

Submerged forests occur frequently near the coasts of England and northern France. They are sometimes covered with sand and mud. All the trees and shrubs occurring in these forests belong to the same species as those that now vegetate on the respective shores. In England it is Cheshire, and in France, Normandy and Brittany that are tranquilly subsiding. In the foregoing it has been stated that the secular elevation of the eastern coast of Sweden diminishes towards the south. Indeed, at Calma it amounts only to one foot per century, reaching its limit further on while in the southernmost part, in the province of Scania, there is actually a loss instead of a gain of land. Since the year 1778 a gradual subsidence of a large portion of Greenland has also been established. It is especially the western coast, from the 60th to the 77th degree of latitude, that partakes in this movement. In the United States, the shores of New Jersey, and perhaps those of all the southern Atlantic States, are gradually subsiding.

ELEVATIONS ON THE SHORES OF THE MEDITERRANEAN AND THE ATLANTIC—FRANCE GAINING GROUND IN THE SOUTH, BUT LOSING IN THE NORTH.

According to HOFFMANN and SARTORIUS, the island of Sicily must have experienced considerable elevations, some of which, they say, took place suddenly. The *Grotto di Mardolce*, the entrance of which is about one hundred and eighty feet above the sea, is said to be especially noteworthy. There is seen a horizontal stripe on the wall, eight feet from the ground, to which marine shells adhere, while the rock below presents the perforations of thousands of boring worms. Above, the elsewhere roughly indented material is washed out, presenting a well-polished surface. The spot in question has an elevation of two hundred feet. At Nizzeti, we meet with the same instance six hundred feet, and at Catira, one thousand feet above the sea.

Similar phenomena have been brought to light by DE LA MARMORA, on the island of Sardinia. The shells of the formerly-existing mollusks are well preserved, and sometimes occur together with fragments of pottery. Similar rises of land have occurred in the whole domain of the Mediterranean. On the European shores of the Atlantic, other remarkable proofs of pre-historic elevations have been ascertained. Some of them took place instantaneously, others gradually, being still in progress. Near La Rochelle, in France, a ship was wrecked upon an oyster bank in 1752. The wreck now lies in the midst of a cultivated tract of land, fifteen feet above the ocean, the community of the district having gained over five hundred hectares of land within twenty-five years. Port Bahana, where the Dutch ships used to get their cargoes of salt, lies now at a distance of nine thousand feet from the waters; and the former island Olonne is at present surrounded with swamps and meadows. It seems also that some parts of the interior of France were submerged at a comparatively recent period. But no country presents so many and so well authenticated observations in regard to the upheaval of its coasts as England does, which may be accounted for by the great development of its borders, and the great number of geologists that inhabit it. Let it only be mentioned that while the western coast line, from Northern Scotland to Cornwall, presents a number of elevations, the southern coast has furnished many proofs of depressions.

On the North American side of the Atlantic similar changes have been noticed. It is, for instance, established without doubt that Newfoundland is at present slowly rising. Rocks which, thirty or forty years ago, could be passed over by schooners with safety, now lie near the surface. Indeed, these and other facts seem to point out that the whole northeastern coast of North America is now gradually being uplifted by unknown and hidden subterranean forces.

SOUTH AMERICA ELEVATED FIVE HUNDRED FEET IN PRE-HISTORIC TIMES.

During the fearful earthquakes that took place in Chili in 1822, Mrs. GRAHAM, an English lady of high scientific attainments, declared, on the ground of actual observation, her belief that similar upheavals must have occurred at former periods. Subsequently, the great English naturalist, DARWIN, brought conclusive proofs to light that the entire coast of South America, since the appearance of the now living mollusks, must have been driven upwards of four hundred to five hundred feet, and the interior probably still more. He discovered at the coast of Coquimbo from five to seven terraces of denudation, one above the other, and all containing the shells of mollusks identical with now-existing species. Between these terraces DARWIN found not only *débris* of seaweed, but also pieces of cotton-yarn and twisted bast, which prove that these upheavals took place during the existence of man. Patagonia, according to DARWIN, has risen three hundred to four hundred feet; and proofs for a former upward movement exists for the whole portion extending southward from the La Plata to Terra del Fuego. D'ORBIGNY, who confirms the facts ascertained by the English naturalist, furthermore discovered an immense deposit of sand between the Rio Colorado and Rio Negro. This deposit is situated six thousand feet from the coast, lies one and a half feet above the highest spring tide, and includes crystals of gypsum and the species of *testaceæ* still inhabiting the bay. D'ORBIGNY observes that the remains of these animals are exactly in the same position as during life, and concludes that the upheaval was a sudden and not a slow one.

Drying Timber by Steam.

MR. VIOLITTER has lately presented to the Academy of Sciences in Paris, a very able communication on the desiccation or drying of different kinds of wood by steam. He states that steam raised to 482 degrees, Fahrenheit, is capable of taking up a considerable quantity of water; and acting upon this knowledge, he submitted different kinds of oak, elm, pine, and walnut, about eight inches long and half an inch square, to a current of steam at seven and a half pounds pressure to the square inch, but which was afterwards raised to 482 degrees. The wood was exposed thus for two hours. It was weighed before it was exposed to the steam, and afterward put into close-stoppered bottles until cool, when the samples were again weighed, and showed a considerable loss of weight, the loss of which increased with the increase of the temperature of the steam. For elm and oak the decrease in weight was one-half, ash and walnut two-fifths, and pine one-third. The woods underwent a change of color as the heat was rising from 395 degrees to 442 degrees; the walnut became very dark, showing a kind of tar formed in the wood by the process, which was found to have a preserving effect on the wood.

It was found that wood thus heated became stronger, having an increase in the power of resisting fracture. The maximum heat for producing the best fracture-resisting power for elm was between 302 and 347 degrees, and between 257 and 303 degrees for the oak, walnut, and pine. The oak was increased in strength five-ninths, walnut one-half, two-fifths for pine, and more than one-fifth for elm. These are but preliminary experiments, which may lead to very important results, and are, therefore, interesting to architects especially. By this process the fibres of the wood are drawn closer together, and maple and pine treated in the steam, at a temperature of 487 degrees, were rendered far more valuable for musicsl instruments than by any other process heretofore known. This is valuable information to all musical instrument makers. Who knows but this is a discovery of the Venetian fiddle-makers' great secret. —*Engineering.*

A New Process for the Extraction of Copper from Its Ores.

BY DR. T. STERRY HUNT, F. R. S., AND JAMES DOUGLAS, JR., ESQ.

[This new process, for which Letters Patent have been granted in the United States, Great Britain, Canada and Newfoundland, may be understood from the specification of the British patent, given below, to which are appended a series of explanatory notes and comments. The date of the patent in Canada is January 14, 1869, in the United States, February 9, 1869, and in the United Kingdom, August 13, 1869.]

SPECIFICATION.

1. For the extraction of copper from its ores by this process, it should be in the state of an oxide or some compound thereof, as oxychloride or carbonate. These oxidized forms of copper are decomposed under proper conditions by protochloride of iron, with the production of dichloride of copper, which is soluble in certain saline solutions, and in some cases a portion of protochloride of copper, together with insoluble peroxide of iron, and more or less insoluble oxychloride or basic persalt of iron, which may be rendered soluble by the action of sulphurous acid.

2. The naturally or artificially oxidized ores are to be digested with a watery solution of neutral protochloride of iron, with or without the addition of an earthy or alkaline chloride, as common salt. The neutral protochloride of iron may be conveniently prepared by double decomposition of protosulphate of iron with an equivalent of chloride of calcium or chloride of sodium. In preparing the solution hereinafter designated as the bath, we may proceed as follows:

3. One hundred and twenty (120) pounds of sea salt, or one hundred and twelve (112) pounds of dry chloride of calcium, or its equivalent of hydrated chloride, are to be dissolved with two hundred and eighty (280) pounds of protosulphate of iron, (green copperas) in one hundred (100) imperial gallons of water. In place of the above salts we may substitute an amount of protochloride of iron prepared by any other method, containing fifty-six (56) pounds of metallic iron. To the bath prepared in either way, two hundred (200) pounds of sea salt are then added, when the solution is ready for use, and will be found capable of chloridizing and dissolving about ninety (90) pounds of copper. The power of brine to dissolve the dichloride of copper formed increases greatly with the strength and temperature. The proportions above given are convenient, but in the case of poor ores, a solution of one-half the strength may be used with advantage.

4. In the treatment of copper ores by this process, they may be divided into two classes, non-sulphuretted and sulphuretted ores.

5. The first class, or non-sulphuretted oxidized ores, includes the native oxides of copper, the carbonates, and the oxychloride. To prepare these for treatment they should be finely pulverized, and the carbonates may with advantage be gently calcined before or after grinding, in order to expel carbonic acid. The red oxide, if alone or greatly predominating, should also be gently calcined after grinding, to convert it into protoxide; but if it be mixed with a considerable proportion of protoxidized ore, this is not necessary.

6. The pulverized oxidized ores thus prepared are to be digested in the above bath, with frequent agitation. Heat is not necessary, but accelerates the solution of the oxide of copper, which in practice should not be more than sufficient to yield sixty or seventy pounds of copper to the above bath of one hundred gallons. When the solution is complete and the liquid drawn off, the insoluble residue should be lixiviated with a small volume of hot strong brine. The liquid is then digested with metallic iron, by which the copper is thrown down as cement copper, two parts of iron yielding three parts of metallic copper.

7. The bath thus freed from copper contains a large amount of regenerated protochloride of iron, and can be used at once to treat a fresh portion of oxidized ore. A small loss of chlorine, which separates as oxychloride of iron, has, however, to be supplied by adding to the bath, from time to time, protochloride of iron or the salts required to produce it. This need not, however, exceed for each repetition, one-eighth of the original quantity, and by careful exclusion of the air the quantity to be added each time may be reduced to much less. The strength of the bath in protochloride of iron should be determined from time to time by appropriate tests.

8. In localities where it may be desirable to economize the protochloride of iron, a modification of the process may be

adopted, which consists in treating with sulphurous acid the iron compounds precipitated by the oxide of copper. To this end, sulphurous acid from the roasting of sulphuretted ores, or from any other source, may be made to pass over or through the bath, after or during the process of dissolving the oxide of copper. In this case the protosalts of iron are constantly regenerated, and serve to chloridize fresh portions of oxide of copper. A small amount of protochloride of iron, with the aid of sulphurous acid, may, in this modification, be used to convert a large quantity of copper into dichloride, the excess of which is precipitated, and may be washed out with hot strong brine. As this deposits a large quantity in cooling, the same brine may be employed indefinitely for dissolving dichloride by heating and cooling it each time.

9. The solid dichloride is rapidly reduced by contact with metallic iron, especially when wet with brine, and yields metallic copper and protochloride of iron, one part of iron giving two of copper. To prevent any precipitation of oxychloride of copper from the dichloride solution by the air, it is well in all cases to have a small portion of protosalt of iron present. A little free sulphurous acid will also prevent such precipitation; but any excess of this gas should be expelled or allowed to escape from the solution before adding metallic iron.

10. In the case of sulphuretted ores, the first step in the application of our process has for its object to convert the metal into an oxide soluble in the bath already described. This conversion is effected by calcination in the air, by which means all copper, iron and sulphur are oxidized. [Pyritous ores, holding much iron and sulphur, may be roasted in kilns, then ground and re-calcined, but native sulphurets, rich in copper, or regulus, should be ground before calcination, which is best done in a muffle furnace. In either case] a low red heat suffices, and what is called a dead roast is to be avoided, not only because it involves a waste of time and fuel, but because the high temperature renders a portion of the oxide of copper insoluble in the protochloride of iron bath. The roasting need be continued only until the complete oxidation of the sulphuret of copper, and its conversion into a mixture of oxide with a variable proportion of sulphate of copper. This product may be treated directly with the bath, without addition, as directed for non-sulphuretted ores, but the excess of sulphates thus introduced renders the bath impure, and much more metallic iron is required for the subsequent precipitation than when the whole of the copper is in the form of oxide.

11. We therefore prefer to proceed as follows: We determine in the roasted ore the amount of copper present as sulphate, which will vary very little for any given ore roasted under constant conditions, and we add thereto an equivalent of lime, which gives rise to insoluble sulphate of lime and oxide of copper. In practice it is well to leave undecomposed a small amount of sulphate of copper, which, in a subsequent stage of the process, will give with metallic iron the sulphate of iron required to replace the small loss already mentioned as occurring when sulphurous acid is not used. To an ore, for instance, with eight per cent. of copper, which after roasting contains three per cent. of copper as oxide, and five per cent. as sulphate, we may add lime enough to decompose four-fifths of the latter, at the rate of 28.0 parts of pure lime for 31.7 parts of copper, or about an equal weight of ordinary non-magnesian lime; being four pounds of finely ground lime for each one hundred pounds of the above roasted ore. An equivalent quantity of carbonate of lime, or other alkaline or earthy base, may be used instead of quick-lime, but with less advantage. The roasted ore and lime may be added to the bath together, or better, the ore is to be added first. The subsequent part of the process is to be conducted as already described for the ores of the first class.

12. When protosulphate of iron is used instead of the protochloride in preparing the bath, or in keeping up its strength, as in the case of ores of the first class, sulphate of soda is formed, which may in great part be crystallized out by extremes of heat and cold. The formation and accumulation of this sulphate may, however, be prevented by the use of chloride of calcium as already set forth. The still larger production of sulphate of soda, which would take place if calcined ores of the second class were added directly to the bath, is prevented by the use of lime as already described, and that portion which must result from the excess of sulphate of copper, as recommended, may be decomposed by the addition of small portions of chloride of calcium from time to time. By attending to these precautions the strength of the bath in chloride of sodium, and its solvent power may be indefinitely maintained.

13. We do not claim the use of any particular form of furnace, nor of any special arrangement for calcining, lixivating, or precipitating, reserving to ourselves the choice of the best forms of apparatus for these purposes; neither do we claim the use of protosalts of iron otherwise than in solution, nor the use of perchloride or other persalts of iron, nor yet the use of sulphurous acid save and except in connection with protosalts of iron, as already set forth.

14. What we claim as our invention is:

I. The use and application of a solution of neutral protochloride of iron, or of mixtures containing it, for the purpose of converting the oxide or suboxide of copper, or their compounds, into chlorides of copper.

II. The use of sulphurous acid for the purpose of decomposing the oxychloride of iron formed in the preceding reaction.

III. The use of a process for the purpose of extracting copper from its naturally or artificially oxidized compounds by the aid of the first, or the first and second of the above reactions, substantially in the manner already set forth.

WORK has been resumed in the Broad Top coal region. The operators compromised with the miners, by making the reduction 10 cents instead of 15 cents.

MINING SUMMARY.

California.

We extract and compile from the tables of the San Francisco *Commercial Herald* the following statistics:

TREASURE PRODUCT, IMPORTS, ETC.

The receipts of treasure from all sources (uncoined and coined) through regular public channels, during the past twelve months, as compared with the same period in 1868, have been as follows:

	1868.	1869.
From California, Northern Mines	$41,149 895	$38 356 253
From California, Southern Mines	4,784,045	5,689.122
From Coastwise Ports, Oregon, etc	5,241,015	5,241,029
Imports, Foreign, British Columbia, etc	3,336,280	6,023,677
Totals	$54,510,235	$55.310 151
	1867.	1868.	1869.
Uncoined	$46,257,320	$43 273,157	$35,221,001
Coined	5,340,184	7,900,798	14,065 473
Total	$51,597,504	$51,173,955	$49,286.474

The annexed table exhibits the interior receipts, imports foreign and exports for the years 1867, 1868, and 1869:

	1867.	1868.	1869.
Interior receipts	$51,597,504	$51,173,955	$49,286,474
Imports, Foreign	3,969 322	3,336.289	6,023 677
Total	$55 566,826	$54,510.235	$55 310,151
Exports	41,676,292	36,444,395	37,287,117
Currency movement	$13,890,534	$19,065,840	$18,023,034

The heavy falling off in the receipts of uncoined bullion at this place for 1869, as compared with those of former years, while attributable in part to the diminished production of the mines upon the coast, is mainly due to other causes, chief among which is the very considerable shipments of bullion made directly East by railroad from Eastern Nevada, Idaho, Utah, and Montana, and which before the completion of that thoroughfare, was sent to this place. Latterly, and since the White Pine mines have become more largely productive, about one-half their proceeds have taken that direction, much of it having been transmitted in the first instance to various points, to suit the convenience of parties residing in different parts of the country being large owners in those mines. These shipments have been going on throughout the year; slightly at first, but more fully and with constant acceleration since the opening of the railroad. What little bullion has been produced in Utah has also, no doubt, mostly gone in that direction. The diversion East of the product of the Idaho mines has not been large; being perhaps a million more than formerly went that way; while it is fair to presume that almost the entire yield of Montana for the past year has been turned into Eastern channels. During the year a good deal of silver has arrived in San Francisco in the lead bars sent from the various smelting districts, none of which has been included in the figures representing the gross yearly receipts of this place. The value of the precious metals coming here in this shape would probably aggregate half a million of dollars. After giving these causes due credit for their agency in diminishing our last annual receipt of bullion, there remains a balance of deficit which can only be accounted for by an admitted decline in the product of our mines; and in evidence of which we have the fact of a slight falling off in the returns from Nevada, and the probabilities of a similar result in Oregon, Idaho and Montana, the California product varying but little perhaps from that of the preceding year.

In view of the foregoing facts it will be seen that the diminished bullion yield of the coast, as reported for the past year, is more apparent than real; suggesting the probability that the mining interest during this period has been fairly prosperous.

MINT STATISTICS.

The coinage at the Branch Mint in this city, for the year 1869, compares with that in 1866, 1867, and 1868, as follows:

	1866.	1867.	1868.	1869.
January	$315 000	$124,000	$97,000	$467,000
February	910,500	1,022,000	640 000	185,000
March	1,360,000	978,535	575,000	743 000
April	1 113 000	1,895,000	710,000	1,579,000
May	2 165,000	2,505,000	714,000	985,000
June	1,126,000	1,420,000	922,000	1,348 000
July	1,004,000	1 152,000	2.35?,000	1,640 000
August	1,778 000	2,380,000	1,465,000	689,500
September	1,616,000	1,883,000	2,485,000	2.550,000
October	2,312 000	2,361 000	2.415,000	1,669,300
November	2,214,000	2,260,000	2,595,000	1.648,000
December	1,719,000	1,284.000	2.422,000	1.459,750
Totals	$17,915,500	$19,370,535	$17,365,000	$14,363,550

The operations of our Branch Mint have been restricted by reason of diminished deposits, arising from correspondingly diminished receipts of bullion and dust from interior points. The coinage for 1869 falls short of that for 1868 by $3,000,000, and that of 1867 by $5,000,000. This deficit is by no means owing to the decreased capacity of our mines, but is more directly the result of a large emigration to those of White Pine and other districts, and to the increased attention paid to farming, which has engaged many hands formerly employed in getting out the precious metals. The sad calamity which ravaged three of the most productive mines on the Comstock lode, also contributed to a materially diminished supply of bullion; besides which the Mint was idle during a portion of July, to prepare for turning it over to the new appointees. There is good ground for the belief that the bullion supply for 1870 will very considerably exceed that for the year past.

THE ALPINE COUNTY MINES.

The Monitor *Miner*, January 1, says that the Exchequer Mining Company of London have purchased from Mr. Daniel Davidson his quartz and saw-mill and extensive ranch on Silver creek, just at the foot of the mountain from the mines recently purchased by them, near the head of Indian creek in Alpine District. The purchase price is $20,000, one half cash and the other half in stock of the Exchequer Company. The company will build a road from the mine directly to the mill, and quite a little camp is likely to spring up as the result. The manager is expected here within a few weeks, and the work of getting out timber for the mine is already commenced. Three shifts are at work on the Schenectady Company's new tunnel. We are glad to learn that good progress is being made therein. Good looking rock is now coming out of the Imperial tunnel. An ore deposit of value is thought to be near at hand. Even the country rock now seen is filled with ore, some of it of good character. The owners of the Sam Booth, Esmeralda and Alart combined properties, having purchased the Wide West Tunnel, will put a force at work thereon immediately. This tunnel is now in over two hundred feet, and is running along the east casing of what is better known as the Tarshish lode, of which the Schenectady S. M. Company have the north extension.

Montana.

CEDAR CREEK.

The news from this camp, says the Deer Lodge *Independent*, Jan. 22, continues about the same. The miners are mostly busy building cabins and getting in supplies, and but little prospecting is being done. Once in a while a report comes out of big prospects being found. This, of course, is merely sensational, and cannot be taken as any indication of the wealth or poverty of the camp. Also, I sometimes find one who is dissatisfied with the camp, and would, if he could, pronounce it a "bilk;" but ask him for a candid opinion of the camp, and he will tell you that five or six miles of the creek will pay, and, upon the whole, he "thinks there is going to be a good camp." Claims are selling well. No. 17 below discovery sold a few days since for $1,000, money down—no "bed-rock" or "jaw-bone;" and I have heard of several other claims selling equally well. The towns are prospering, and buildings are going up without number. Next summer—gold or no gold—I predict for it a large population. No gold excitement since Florence, in 1861 and 1862, has caused so much excitement.

Michigan.

The Houghton *Gazette* gives the following statement of mineral and ingot copper shipped from the Houghton district during the past season, as shown by the books of the Portage Lake and River Improvement Company:

COPPER SHIPMENTS FOR 1869.

	Mineral, lbs.	Refined, lbs.	Total Tons.	lbs.
Hecla mine	1,347 470	4,3-8 719	2,8 8	189
Calumet	1,056 748	2,773,333	1,915	81
Quincy	2,877,808	.....	1.438	1 8 8
Franklin	.....	1,595,400	797	1,100
South Pewabic	.....	1,585,259	792	1,359
Huron	.....	1,062 650	546	650
Pewabic	.....	975.117	487	1,117
Schoolcraft	13,038	271,131	142	169
Sheldon & Columbia	236,600	.....	118	....
Isle Royal	.....	150,671	75	071
Hancock	.....	112,550	56	550
Grand Portage	.....	79,514	39	1,714
J. A. Hubbell (Concord)	.....	22,446	11	446
Philip Tucker	.....	10,272	8	272
Adams mine	.....	12,748	6	748
Thomas Towan	.....	750	....	750
Total	5,431,063	13,076 920	9,303	1,484

The *Gazette* adds, "So far this has been the mildest winter known to the copper districts, and the severest known to the iron districts of Lake Superior for more than ten years. There is full five feet of snow on the mountains between Portage Lake and Marquette. A fire at the Phœnix mine destroyed the blacksmith shop and changing house. Loss about $1,000. The December product of the Pewabic was forty and three-fourth tons. Considerable movement in the stock of the Seneca company is reported by late eastern advices. The vein opened on that property has a remarkably good show of copper. Some English capitalists are reported as coming over in the spring to examine and probably work the Mendota deposit on quite an extensive scale. At the Pewabic, the long wire rope used for hoisting purposes broke and another is not to be had in all this region; consequently, most of the work has been suspended. A general overhauling of machinery and repairing is decided on, and sixty-five miners and thirty laboring men have been discharged, and no increase of force is expected before spring. This is very unfortunate for the men thrown out of work in mid-winter."

Colorado.

THE BRIGGS MINE.

The Colorado *Herald* says: "The Briggs mine has produced another monthly specimen of bullion, in the shape of a magnificent retort, weighing 420 ounces, valued at about $8,500. During the milling of the ore from which this retort was produced, there was selected and sold for smelting about forty tons, worth $3,000. This is the result of intelligent mining and milling. The Briggs property was sold to New York capitalists in 1864, who, besides paying the purchase money, expended over $50,000 in improvements, and permitted a debt of $20,000, upon which the property was afterwards abandoned by the Company. The original owners assumed the debt, and again took possession. In less than ninety days the mine produced profits sufficient to reimburse the outlay, and every month since has been producing an income equal to 15 per cent. on a capital of $500,000."

Utah.

MINING AT COTTONWOOD.

The Salt Lake *Telegraph*, of January 28, has the following: "Yesterday we met two gentlemen from Little Cottonwood, who are heavily interested in quartz mining at that place. They represent their own operations very successful, and expect to see a good deal of increased labor there during the forthcoming summer. They sent a quantity of quartz in San Francisco last year, probably 300 tons, and at the present time are getting out about ten tons a day, on which it is said they clear over $30 per ton. They will quadruple their force in a few weeks. We hear of other mining operations elsewhere, indicating that some folks are determined to pursue that calling."

Nova Scotia.

We find in the Montreal *Herald* of Feb. 4 an excellent review of mining in the Dominion of Canada for 1869, from which we extract the following on Nova Scotia. The valuable notes of Prof. Bell on Quebec and Ontario will be given hereafter:

"The speculative mania which commenced in 1867, and culminated in 1868, has suffered a collapse during the past year. During the excitement numbers of properties were sold, which could really claim no title to the name of 'mine.' Most of these doubtful enterprises have been abandoned, and the field is now clear to the honest miner. There are at present about thirty mines being worked in the Province, all of which, with few exceptions, are yielding fair profits. These profits might be very much increased if proper means were taken to save all the gold which the quartz contains. The following are the principal mines which have been worked for the past year:

"WAVERLEY DISTRICT.—Prof. Hind was instructed by the Local Government to examine this and some other districts. His report of Waverley has been issued by the Government, accompanied by a geological map. It may serve, in some measure, as a guide to explorers, but the theory, which is the key to the map, cannot be accepted without further proof. Mr. Selwyn will probably put the matter to its true light by his proposed investigation into the geology of the gold fields during the approaching summer. Mr. Burkner has been doing considerable exploring work during the past summer, and has found what he supposes to be the southern dip of the Tudor lead. The quartz varies in thickness from six inches to fifteen inches, and has yielded $17 per ton. The richness of the northern dip of this lode was remarkable. In one year he crushed 6,972 tons, which yielded 8,727 oz. 11 dwt.—an average of $26 per ton. Fully one-half of this was clear profit. Mr. De Wolfe, in the adjoining claims, has done but little mining. Some work on tribute has served to keep the mill partially employed. The Boston and Nova Scotia, under the management of Mr. Wm. Clarke, is being skillfully and carefully worked. He has put down the deepest shaft in the Province—370 feet. The twelve-stamp mill is fully employed, and

working to a fair profit. The yield of gold from a fifteen-inch lead is from $8 to $16 per ton.

"MONTAGU.—This district has done better during the past year than any previous one. The average yield of gold has always been higher than that of any other district, 2 415 tons 17 cwt. yielded 4,660 ox. 5 dwt. 2 gr., or an average of $33 75 per ton. The Albion mine has been reopened by Mr. Walter Lawson. A new engine has been erected for pumping and hoisting; but having no crusher, the quartz is crushed at the Montagu mill. About forty men are employed, and the work being economically done under the superintendence of the proprietor, a good monthly profit results. The Montagu mine is being worked under the management of Mr. W. H. Brown. The property being very extensive and means limited, it has not been much explored. Three lodes of value were discovered during the last year, and are now being worked, while others of good promise have been opened, but await further development. A new engine of thirty-five horse-power has been erected on the Belt lode, connected with suitable pumps and hoisting gear. The last ten tons from a depth of 145 feet yielded 23 oz. gold, or $46 per ton. A new mill with fifteen stamps is nearly completed. The machinery is all of the newest design, and is adapted to the concentration of the tailings and saving of all the gold.

"LAWRENCETOWN.—The Westminster Mining Company, of London, purchased in May last the property formerly worked by Mr. Werner. The work has been laid out by Mr. Robinson, an engineer sent out from England, and is being carried on by Mr. Frecheville. A vertical shaft is being sunk to intersect the lodes. It is an excellent piece of work. The mill has been remodelled, and has now two batteries of five stamps each, together with a Blake's breaker. The prospects of the Company are very encouraging. The developments made by this vertical shaft will be watched with considerable interest by geologists, as they will tend to solve the question, whether these quartz lodes are veins formed by the folding of the strata or true interstratified beds deposited contemporaneously with the enclosing rocks.

"MOUNT UNIACKE.—This district has fallen off very much during the past year. Mr. McIntosh has carried on the work for the Boston and Uniacke Company with considerable economy and skill. The mine has always paid a fair profit; but part of this has been wisely invested in opening up the mine more extensively. A cross-cut has been driven at a depth of ninety feet, and two valuable lodes have been intersected; one two feet wide yielded only $7 per ton at the surface, but at this depth it gave $18. The mill contains eight stamps, which are not sufficient for the capabilities of the mine. It is rumored, however, that an English Company has purchased the mine for $60,000. The Montreal mine still languishes. Some work has been done on tribute during the past year. A good working capital is necessary to develope the value of this property, and there is every reason to believe that it would have a good result. The Queen, Westlake, Union, and a host of others have either been abandoned or continue work only with a few men on tribute.

"OLDHAM.—During the past year this district has increased in interest. The Frazer & Ritchie claim yielded some very rich quartz, principally carrying coarse gold and nuggets. Messrs. Tucker, Tobin and Canning have continued work with skill and enterprise on their properties. The mill of eight stamps has been put in good condition, and altogether their prospects are good. It is understood that some English capitalists have been enlisted in the enterprise, and work will therefore be carried on with more vigor. The Boston and Oldham mine changed hands, and under efficient management is likely to add considerably to the product of the district. The mine belonging to R. G. Frazer & Co. was worked for the first half of the year, but the returns falling off, work was stopped. There are several other parties at work, but mostly on a very limited scale.

"RENFREW.—The Ophir Company has not produced so largely during the past year as formerly. Owing to the unexceptionally dry summer and autumn, the mill could not run for some months. The rich bunches of ore in the north and south lodes have been pretty well worked out, and they are now obliged to fall back upon the poorer portions. There never was a more glaring example of improvident mining. In two years this mine earned a clear profit of $150,000, but every dollar had to go into the pockets of the shareholders, and not a dollar was spent upon opening up the mine. Had ten per cent. of the profits been expended in opening up the lodes, the Company would have had a good dividend-paying mine for many years to come. The Colonial Company owns the extension of the Ophir lodes, but at present does not work them. The rich quartz of the Ophir dips into the Colonial property, impoverishing the Ophir and enriching the Colonial. The latter cannot take advantage of its position, as they have no machinery for pumping and hoisting. The McLeod lode continues to yield very rich quartz. There are many known valuable lodes on the Colonial property, but working capital is required to develope them. The mill of sixteen stamps is probably the most substantial in the Province, and it could be kept fully employed if a little enterprise were shown in opening the mine. The year's working has resulted in a profit, but not in proportion to the capabilities of the property. The Free Claim was purchased by Mr. C. H. Gay and others, of Boston. The mine has been well equipped and a very rich lode opened up.

"TANGIER.—The Strawberry Hill Company declared a dividend during the year, but some time has been lost and money spent in opening up the continuation of the Forest lode. The late returns have been very satisfactory. The New York Company's property changed hands, and work was commenced in the autumn. The mine is well equipped, and the quartz has yielded about 14 dwt. per ton.

"SHERBROOKE.—The Wellington mine, which has always yielded large returns, was stopped for some months during the summer. The lode had been worked to the limit of the Company's property, and they were, therefore, compelled to stop or purchase the adjoining areas. They accomplished the latter on favorable terms, and work was resumed in the autumn. The quartz has proved rich, and the monthly profits are stated to be over $3,000. An English Company is reported to have purchased the whole property for $60,000. The Dominion mine has continued to yield steadily. The lode is wide, and produces from $6 to $13 per ton. Some of the smaller lodes on the same property have yielded from $40 to $60 per ton. The new mill of the Company has been in operation all year, and does its work well. Mr. G. J. Dickinson, formerly of the Rivere Copper Company, took charge of the mine in May last, and had he been in charge from the first the Company would have been in a different position. A very grave mistake was made financially. Instead of the Directors calling up the amount provided for working capital, they borrowed the money, and the mine has been laboring under debt ever since. With present appearances, a few months' work will clear this away, but, nevertheless, this same policy almost invariably proves fatal to any mining enterprise. The Palmerston completed a new water-power mill of twelve stamps during the year, but very little work has been done in opening up the mine. The Chicago mine made good progress under the new manager, Mr. Twist. He has had great experience in California, and feels sanguine that he can work to better advantage in Nova Scotia. The past year has been one of expenditure, and this year will prove one of dividends. The New York and Sherbrooke Company made a good discovery in the autumn, a new lode, fifteen inches wide, and yielding about two ounces per ton. Mr. Zwickel, the manager, was in Europe the greater part of the year, and but little work was done in consequence. The Wentworth was sold in December by sheriff's sale, but bought in for the principal shareholders. There is an excellent mill, and the quartz from the principal lode would pay well if economically worked. The Woodbine and Caledonia have disappointed their purchasers in every respect. The Meridian has done nothing during the year towards developing the rich lodes which must traverse the property. The same may be said of the Canada. They both have excellent mills, but it would have been wiser to develope the mine first and build the mill afterwards. The Crescent, Delta, Blue Lead, Ayon, and a host of others may be numbered with the dead or dying.

"WINE HARBOR.—The Eldorado tunnel was finished up to the middle lode. The mill was refitted with new batteries, and all put in good order. Some misunderstanding among the proprietors caused the property to be sold, and the ownership is still in dispute. The Provincial has done nothing for the last six months of the year. New machinery was provided, but never erected, the property having been sold in December to cover advances. This mine has produced gold to the value of $300,000, and where this large amount came from there is every likelihood of obtaining more. Working capital is again the necessity. The Napier has been opened in a more systematic manner than any other mine in the Province. Several rich lodes have been cut, but work has been almost entirely suspended, pending the transfer of the property to an English Company. The Eureka erected machinery for pumping and hoisting, and finished a new mill of fifteen stamps. It has produced very little gold so far, but the property is valuable. Working capital is required. The Orient changed hands in the autumn, but no work has been done. The Globe, McIntosh and Stadacona have been under the management of Mr. D. McIntosh. The first named produced considerable gold during the early part of the year, but the properties are so mixed up that it is difficult to obtain satisfactory information concerning them.

"ISAAC'S HARBOR.—The Mulgrave unfortunately came to grief, and was sold. It was bought in on account of Mr. Hugh Adan and others. A new lode discovered last summer promised well, but we have not heard the results of the crushing. A very important discovery was made in the autumn in this district. At Dung Cove a rich band of slate and quartz was uncovered. A width of fully four feet is extremely rich, and is reported to have yielded nearly six oz. per ton. One-half interest in the property was purchased by Mr. F. N. Gisborne, of London. This rivals the best results of any mines in California or Australia. Explorations were carried on at Gold River from May until November by Mr. A. Michel. He is the most skilful and thorough explorer who ever yet attempted it on a large scale in Nova Scotia. He found gold in the alluvium over a wide area, and his report will be valuable. Some work was carried on at Ovens during the summer, but it has since been stopped, Mr. McKay, the proprietor, having been dissatisfied with the results.

"MUSQUODABOIT.—Mr. Burkner has done considerable work here during the past year. The Leopold mine is about to be purchased by the Halifax Gold Mining Company of London. The lode is eight feet wide, and yields from $5 to $7 per ton. Some smaller lodes have given higher results; eighteen tons from a cross vein yielded 64 oz. of gold. There is an eight-stamp mill on the property. Mr. Turquois, who owns some adjoining claims, discovered a very rich cross vein on his property. The result of the crushing we have not yet heard. Some prospecting has been done in other localities, but with no very interesting results. Taken as a whole, the result of the year's mining has been highly favorable, and the current year will show a still greater improvement. The report of the Commissioner of Mines has not yet been published, so it is impossible to give the figures for the various districts, but the average earnings of the miners will be greater in 1869 than in the year preceding. In 1868 an average of 775 men earned $490 34 each. This, of course, included a very large number of men employed in exploring and on other unproductive work. During the past year there was less waste of labor, and consequently the average earnings will be higher.

"The depression in the coal trade has continued during the past year. In the autumn a strong impression prevailed that the American duty on coal would be reduced to fifty cents per ton. This tended to revive a little speculation, and several undeveloped areas changed hands. Considerable exploring has also been done by Mr. John Campbell and others.

"PICTOU COUNTY.—At the Albion mine the extensive operations commenced in 1867 were completed in the early part of last year. A new portion of the great coal-field is now opened up. The Ford shaft reached the main seam at a depth of 340 feet. The engines, together with the machinery for pumping and hoisting, are now at work. For style, power and durability, there is nothing on the Continent to equal them. Soon after the completion of the work the shaft took fire. It was immediately closed and the fire extinguished, but not until considerable damage had been done. Operations were continued in the Dalhousie pit, from which the principal amount of coal was raised. The Albion mine is now in a condition to raise of itself more coal than there is demand for. The Acadia mine, under the management of Mr. Jessie Hoyt, has been thoroughly developed. It is now in a position to produce 250,000 tons annually. The seam is twenty feet thick of pure coal. The Intercolonial, under the management of Mr. James Dunn, has made good progress during the year. The machinery is very efficient, and the railway built by the Company to Middle River, 7¼ miles distant, affords great facilities for shipping. A large quantity of this coal has been shipped to Montreal during the past year. About $250,000 has been spent by the company in opening up the mine and constructing the railway. The whole arrangements display enterprise and skill. The McBain area, which is one of the best in the Province, remains undeveloped. The Nova Scotia, Montreal and Pictou and other companies have done little or nothing during the past year. Sir William Logan, assisted by Mr. Hartley, has given a great deal of personal attention to the examination of the Pictou coal fields during the past two seasons. His report and map will give a clearer understanding of their character.

"CUMBERLAND COUNTY.—At Spring Hill several new seams have been discovered—one of them eleven feet thick, and another said to be fourteen feet. The coal is of excellent quality, containing only about three per cent. of ash, and is therefore very suitable for iron smelting. No systematic developments have yet been undertaken. The Intercolonial Railway will pass through the centre of this coal basin, and afford new facilities for shipment. Work is still carried on at the Joggins, by Mr. Boggs, but the seams being small, and the coal of a poor quality, the operations have been of a very limited nature. The Macon, New York, and Acadia, Lawrence and other mines have remained unworked.

"CAPE BRETON.—The old Sydney coal being a great favorite, the mine has ready sale for all that it can produce. The works are being carried on far under the sea without any difficulty. A new pumping engine has been erected, and the sinking of the main shaft continued. The railway from the harbor has been extended to the new workings. The Victoria, owned by Frazer, Paint and others, has shipped considerable quantities of coal during the year, of excellent quality. A railway and wharf are being built. From the Block House mine a large quantity of coal has been shipped to New York, and the work has been carried on with vigor. Two steamers are employed by the company in carrying the coal. The production from the Gowrie mine still keeps up. The shipping facilities are excellent, and the sale of the coal is vigorously pushed. The Glace Bay, Lingan, Caledonia, South Head, International and others have been pretty well opened up and equipped with the necessary machinery. Whenever a demand for coal arises they will be in a position to meet it promptly. Nothing of importance has been done in any of the other districts. Two rival lines of railway were commenced towards the end of the year, to connect the easterly coal-fields with Sidney Harbor. A New York company, whose President is Mr. Moreton, cut the first sod in November, Mr. Duncan McDonald, of Montreal, is the contractor. The succeeding month Mr. F. N. Gisborne arrived from London with a staff of engineers, and immediately set about the construction of a road, through the same locality. The Local Government held out an inducement to the company who should first build a road—a grant of a valuable coal area one mile square. Hence the rivalry. It appears, however, that the Government had no right to dispose of the mining lands as proposed. The location had been applied for in the usual form by Dr. Jennings and another. The Government refused the application upon the grounds that the area had been reserved, by an order in Council, for railroad purposes. The applicants protested against this division, and brought it before the Superior Court. The Chief Justice decided against the Government, so that neither of the rival companies can obtain the coveted location. Notwithstanding the heavy duty levied upon coal by the United States Government, the Nova Scotian coal-owners might have retained the market if they had shown sufficient enterprise. Had they been contented with the usual rates of English profit, and maintained a supply in the principal ports, they could have taken advantage of every rise in the market. The Local Government, however, levies a duty of ten cents per ton upon coal which, to a mine of the capacity of the Acadia, is equivalent to $25,000 a year. This is not encouraging to local industries certainly. Large screw colliers could also carry the coal much more economically than coasting schooners and sailing vessels.

"Over 100,000 tons of gypsum were shipped from Nova Scotia to the United States last year, and the trade is still increasing. Three-fourths of this have been shipped from Windsor and adjacent ports. The Clifton quarry is the most productive, and has probably yielded over 500,000 tons already, while the supply seems practically inexhaustible. The property was formerly owned by Judge Haliburton, (Sam Slick,) and was purchased by the present proprietor, Mr. Pellow, who had previously been in the Judge's service. A good deal of selenite, called by the miners isinglass, is found here. The Wentworth quarries, near Windsor, produce about 20,000 tons annually. Antigonish county yields a fine variety of gypsum called alabaster. Immense quantities of gypsum exist in various localities in Nova Scotia and in Cape Breton; whole mountains of it show themselves in the Bras d'Or, and along the western shores.

"A valuable discovery of lead was made last September in Upper Stewiack. The galena occurs in irregular masses in the lower carboniferous limestone. Assays of the ore gave eighty per cent. lead, and eight ounces silver per ton.

"The Iron mines near Londonderry have produced about 5,000 tons of ore, used in the furnaces of the Acadia Iron Company. Charcoal is the only fuel at present used; but the completion of the Intercolonial Railway will bring the coal-fields into direct communication with the iron mines. We may then expect an increased production of this valuable iron. The charcoal iron at present produced is not surpassed by the best made in Sweden or Russia."

New Brunswick.

"GRAND LAKE.—The mines at Newcastle Creek have been worked during the year. The seams are small, and the coal is used entirely for local consumption. The Albert mine near Hillsborough has not produced so largely during the past year. The dividend just declared is only 20 per cent. as compared with 40, 50 and 60 of former years. This is accounted for by two reasons. Last summer a fire occurred in the mine, which rapidly spread. All the openings had to be closed, and water pumped in, but the dryness of the season left little available water. Several months' work were lost, besides the injury to the mine. In the next place, last October the 'Saxby' gale carried away the wharf, upon which a large quantity of coal was stowed ready for shipment. So fire and water had both to do with the reduction of dividends. The coal of the Albert mine resembles in character the Boghead coal. It is used entirely for making gas, and was formerly largely in demand for the production of kerosene oil. The Legislature levied an internal revenue duty of five cents per gallon upon all oil made from coal, and so closed up the extensive oil works near St. John.

"The Casco Bay Copper Company have continued work during the year, but the production has been small. An English company has commenced work under the direction of Mr. Waters, upon an made on the Island of Grand Manan, and the property was purchased by some Halifax parties. Captain Gifford was sent out by John Taylor & Sons, of London, to examine it. He describes the deposit as nearly horizontal, lying between the red sandstone and trap, and having a length of nine miles by a width of six miles, and a thickness of from four to seven feet. The percentage of copper is, however, low, averaging from three to four per cent.

"The Woodstock Iron Works have resumed operations. The ore is mined in the neighborhood, and smelted with charcoal. The pig iron is sold by W. E. Coffin & Co., and manufactured into a superior quality of bar iron at the Pembroke Iron Works, Maine. The capacity of the Woodstock furnace is about 2,000 tons annually.

"Manganese and Plumbago have been mined to a limited extent during the year, but nothing has been done with the valuable deposits of antimony."

MARKET REVIEW.

The Coal Trade.

NEW YORK, Feb. 18th, 1870.

ANTHRACITE.

WHOLESALE.—We note little change in the market this week. The dealers have been taking a small amount of coal, but not in quantities to affect the market materially. Prices remain unchanged and there is little probability that they will go any lower. Very little coal is being shipped, as freights are muchhigher to Eastern ports from New York than from Philadelphia—a very unusual thing. The amount of coal on hand in this market is not large, and supplies are not coming in advance of the moderate demand. The regular Scranton sale for the month is announced for Wednesday, February 23; 80,000 tons of the usual sizes are offered. An advertisement of the sale will be found in another column.

In the regions it is reported that the 1st of March will see all the miners "out." It is said that the men have already stopped work in some of the mines. A general meeting of the miners is to be held on the 22d inst., when the course to be taken in relation to "the basis," the eight-hour system, etc., will come up for decision.

The following from the Philadelphia *Ledger and Transcript*, speaks for itself: "To harmonize the several interests which go to make up the anthracite coal trade, and to keep Schuylkill coal in market, Mr. GOWEN, the President of the Reading Railroad Company, has made the following very sensible suggestions to the other parties in the trade. What he says in the letter below is the substance of remarks made to the Anthracite Board of Trade of the Schuylkill Region, in a personal interview, and which that body requested him to put in writing. He says:

"The idea I intended to convey at our late interview was, that while the Philadelphia and Reading Railroad Company was willing to reduce its tolls upon coal intended for shipment to Eastern ports, yet it would not do so without some assurance that the coal operators would make a corresponding reduction in the price of coal, and that the working men would agree to a proportionate abatement in the price of labor. I anticipate a year of low prices, and expect that the low prices will insure an active and steady trade.

"In order to meet the competition in the New York and Eastern markets, it is proper that each of the three great interests, the working men, the coal operators, and the transporter, should suffer a proper proportion of the reduction of prices necessary to meet the market value. And while we shall be always willing and anxious to surrender our fair proportion of the aggregate reduction, it would be unwise to make any abatement whatever in our charges, if the amount reduced is at once added either to the wages of labor or the price of coal, thereby preventing the accomplishment of the great object in view, and enabling the operator or the workman to reap the advantage of the reduction made by the transporter, without benefitting the consumer in the least.

"It will give me pleasure at any time to meet with a committee of your Board, after you have decided up n the course you propose for yourselves, and are able to advise me of the position to be taken by the working men."

From one of our Philadelphia exchanges we learn that a Mr. ELLIS, of Schuylkill, seeks immortality by introducing into the House a bill providing that from and after the passage of the act it shall not be lawful for persons "mining, producing, or transporting" coal to sell the same at auction, either "in this commonwealth or elsewhere." However much we may deprecate the plan of disposing of coal at public auction, the proposition to prohibit such sale by public enactment is too ridiculous to deserve a second thought, save as an immensely silly attempt for fame.

Our Annual Review of the Coal Trade for 1869 has been highly appreciated in all quarters, and we are gratified to find that the labor involved in its preparation has not been thrown away. It was our sincere desire to give full credit to all our contemporaries of whose columns we had made any use. The Pottsville *Miner's Journal*, however, violently attacks us for appropriating the tables prepared at great cost for that paper, without acknowledging it. We cannot afford to bandy words with those who are determined not to recognize fair dealing on our part. We use the *Miner's Journal* as we do any other trustworthy local organ, extracting such returns as we deem suitable. In the present instance, out of thirteen columns of our report, we were indebted for the matter in two or three to that paper; and this matter was rearranged, calculated and corrected in our own office, to suit our own system of reports. If we gave credit to other papers for statistics originally prepared for the *Miner's Journal*, it was because we found them as original in those papers; and our neighbors should cry, "Stop, thief!" not after the innocent holder, but after the actual robbers. These are small matters of courtesy, which we, however, try to observe strictly. The attempts of country papers to insinuate that our returns are made up wholly by stealing from their columns cannot deceive our patrons. This Journal receives regular reports from more than twenty special correspondents in the coal regions, by telegraph and by mail. Our figures are as nearly correct as they can be made by the expenditure of time and money. But our contemporary, not satisfied with claiming that all the figures agreeing with his own are filched from him, asserts that those totals which differ from his are necessarily erroneous, and gives what he is pleased to call the "official quantity" sent to market. We do not know what an "official quantity" is. If by the phrase is meant an official return of the total for the year, we know what that is; but we know, at the same time, that there is no such return in existence. It is a question of correct addition and proof-reading in a newspaper office; and the "official" gentleman who does that sort of thing for the *Miner's Journal* (when not "laid on his back") has not yet achieved the necessary reputation to enable him to sit in judgment on our work. Within its proper sphere, our contemporary is excellent. Outside of that sphere, the less that is said of its performances the better.

BITUMINOUS.

The consolidation of bituminous coal companies which we mentioned last week, seems to have reached its consummation as we learn from the *Civilian and Telegraph*. The consolidations are of the Cumberland Coal and Iron Co. and the American Iron and Coal Co., under the style of the Consolidation Coal Co. The Cumberland and Maryland Companies are to be hereafter known as the Maryland Coal Co. The Midlothian and Johnson mines will probably be consolidated within a short time. If this is effected, the demand increases, and greater activity is given the trade, to the benefit of the miner, laborer, boatmen, merchants, etc. The combination, we think, is not extensive enough to alarm even the most timid, and while we cannot see that any one can be harmed by the matter, much good must result to the companies.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending February 12, 1870, compared with week ending February 13, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	39,955	387.318	28.4.7	413,7.6
†Schuylkill Canal				
Lehigh Valley R. R.	42.7 8	416,1 9	43.446	532 891
Lehigh and Sus. R. R.	16,664	110,843	12,462	112,474
†Lehigh Canal				
Scranton North	9,029	57,750	9,615	72,856
" South	29.741	179,656	14.781	176,774
Penn. Coal Co., rail	12,019	94,0.0	11.2.8	103,135
† " " canal				
Del. and Hudson, rail, N.			9.867	77,1.7
" " " south			3.36.	16,480
Delaware & Hud. Can. N.				
" " S.				
Shamokin	8,241	36,126	44,467	30,598
Trevorton	407	3,248	5.5	2,243
Short Mountain		3,.08		
Lykens Valley Coal Co.	105	3,261		729
†Wyoming South				
† " North			3,261	40 9'2
P. N. Y. C. & R. R. Co.			4,011	18,0.6
Williamstown, Co'y	2,795	8.195		
Total	162,054	1,29.,935	191,117	1,597,903
1870				
Increase week and year				

* Less coal transported for Company's use and Bituminous coal.
† Closed for the Season.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Feb. 12, 1870, compared with week ending Feb. 13, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	15.256	80,435		51,584
C. & O. Canal				
H. & B. T. R. R.	5,164	36,141	2 870	18,440
Harrisburg & D.	552		4,816	61,459
L. V. R. R.		552		2,559
P. & N.Y. C. & R. Co.			2,525	33.914
	20 952	117.128	10 211	167,756

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending Feb. 10, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	28.457 12
Previously this year	388.277 10
Total	416.735 02
Same time last year	357.268 00
Decrease	24.467 02
Amount sent same week 1869	39 945 10

Report of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, February 10, 1870:

From St. Clair	19.933 09
" Port Carbon	3.522 01
" Pottsville	15 03
" Schuylkill Haven	1.692 04
" Auburn	60 12
" Port Clinton	2,484 14
" Allentown and Alburtis	263 09
" Harrisburgh and Dauphin	4.816 09
Total paying freight	33.274 01
Coal for Company's use	1.691 09
Total for week	34.965 10
To same time last year	468.42 01
Total	563,807 11
To same time last year	424,092 19

Report of Coal Transported over Lehigh and Susquehanna Railroad.

Week ending February 12, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR, 1870. tons cwt.	YEAR, 1869. tons cwt
Wyoming Region	85.5 10	8.18 00	79.97 18	61998 02
Upper Lehigh Region	669 19	357.4 17	3.8 11	19815 04
Hazleton Region	113 00	170 13	553 11	8 0 00
Mauch Chunk Region	3183 19	4.70 17	28463 13	2-169 04
Totals	12462 08	16664 07	112473 13	110862 15
Increase			1630 18	
Decrease	4201 19			
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	11608 14	14295 04	108039 06	100673 13
Delivered at and above Mauch Chunk	579 10	870 02	3587 04	4234 02
Delivered to L. & B. R. R. at Plymouth Bridge	274 04	5.0 03	847 03	3200 13
L. V. R. R. at Sguar N.		2.8 18		27.4 07
Totals	12462 08	16664 07	1124'3 13	119:42 15
Of the above there was from Company's Mines	4038 06	4570 17	32827 07	28299 04
Increase			4628 03	
Decrease	532 11			

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, February 12, 1870.

	WEEK.	SEASON.
North	29,880 00	237,963 09
South	3,367 09	16,480 07
Total	33,247 18	254,443 10
Corresponding time in 1869.		
North	38,623 12	219,253 02
South	1,749 13	7,524 19
Total	40,373 05	226,.78 00
Decrease North	8,743 03	Increase 18,710 01
Increase South	1,617 16	Increase 8,955 08
Total Decrease	7,125 07	Increase 27,665 09

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Feb. 12, 1870:

	Tons.
For week	4,816 09
Previously this year	56,642 09
Total	61,428 18

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending February 12, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	3 161 05	37 68' 16	40,942 01
Bituminous	2,525 00	31 3:9 00	33 914 0
Total, Ant. and Bit.	5,786 05	69,069 16	74 856 01

Report of Coal Transported over Lehigh Valley Railroad

For the week ending February 12, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVI'S Y. Tons. Cwt	TOTAL. Tons. Cwt.
Total Wyoming	6,0.5 13	103,723 03	109.458 13
" Hazleton	26,071 14	243,843 19	269 915 12
" Upper Lehigh	167 12	62 13	23. 05
" Beaver Meadow	7,.05 17	87,7.1 19	95,139 16
" Mahanoy	3,090 14	54,.7.. 12	57,5.9 06
" Mauch Chunk	2 01	405 17	4.7 18
Total Anthracite	43,446 11	489,245 00	5.2,691 11
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		2,559 00	2,559 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	43 446 11	491.804 00	535.250 11
Same time last year	42,7.8 12	373,351 00	4.6 149 12
Increase	647 19	118,453 00	119,1.0 19
Decrease			
Forwarded East from M'h Chunk by rail	38,9.9 18	437,820 13	476,750 11
Same time last year	41,767 11	348,219 17	389 987 08
Increase	2,8.7 1.	89,600 16.	86,763 03

RECAPITULATION.

Forwarded East from M'h Chunk by rail	38,929 18	437,8.0 13	476,750 11
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	3,299 05	37,278 09	40,577 14
To L. & S. R. R. at Packerton for rail	237 10	903 11	1,141 01
Delivered at M'h Chunk	11 00	227 11	238 11
Delivered on line of road above Mauch Chunk	129 60	2,332 04	2,461 04
Delivered above M. Chunk for use of L. V. R.R.	8.9 18	9,912 02	10,752 01
To L. & S. R.R., at P'n Hav., for railroad		2,559 09	2 559 09
Do. for canal		6.5 09	655 09
Total Anthracite	43,446 11	489,245 00	53:,691 11
Bituminous Coal		2,559 0	2 559 00
Total all kinds	43,446 11	491,804 00	535,2.0 11

Cumberland Coal Trade.

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, Feb 5, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL Tons.	C. & O. CANAL Cwt	B. & O. R. R. Tons,	B. & O. R. R. Cwt	TOTAL. Tons.	TOTAL. Cwt.
1870			11.341 15		1 .341 15	
1869			10.505 18		10.505 18	
Increase						
Decrease			835 17		835 17	

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870		52,384 06	51,284 06
1869		65.199 00	65,199 00
Increase		13,814 14	13,814 14
Decrease			

B. & O. RAILROAD.

The shipments over the Baltimore & Ohio Railroad for the week ending Feb. 12, 1870, were as follows:

From Georges Creek via Piedmont.	Tons.
Consolidation Co	921 18
Borden Co.	156 05
Midlothian Co.	56 08
Hamp. & Balt. Co	14. 06
From Eckhart R. R.	
C. C. & I. Co.	421 00
Previously	
Total.,	1,701 06

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

	AT NEW YORK, Feb. 17. R. A.	AT NEW YORK, Feb. 17. W. A.	AT PHILADELPHIA, Feb. 16. R. A.	AT PHILADELPHIA, Feb. 16. W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	5 00
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	3 75 to 4 25
Egg	— to —	— —	— —	4 00 to 4 25
Stove	— to —	— —	— —	4 50 to 5 00
Chestnut	— to —	— —	— —	4 00
Pea	— —	— —	— —	— —
LEHIGH.				
Lump	5 75	— —	— —	— —
Broken	5 50	— —	— —	— —
Egg	5 50	— —	— —	— —
Stove	5 75	— —	— —	— —
Chestnut	5 00	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 6 50		— —	— —
New England	"		— —	— —
Locust Dale	W. A. 6 00		— —	— —
Honey Brook, Le'h	W. A. 4 50 to 5 25		— —	— —
Spring Mount	" " 4 50 to 5 25		— —	— —
Sugar Creek	" " 4 50 to 5 25		— —	— —
Sugar Loaf	" " 4 50 to 5 25		— —	— —
Fulton	" " 4 50 to 5 25		— —	— —
Stout	" " 4 50 to 5 25		— —	— —
Old Comp'y's	" " 4 50 to 5 25		— —	— —
Cross Creek	" " 4 50 to 5 25		— —	— —
Enterprise	" "		— —	— —
Girardville	" "		— —	— —
McMichael	" "		— —	— —
Shamokin	" "		5 50	5 50
Lykens Valley	" "		— —	— —
Broad Top	" "		— —	4 75
Hill & Harris	" "		— —	5 50
Henry Clay	" "		— —	5 50
Powelton	" "		— —	5 00

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 25	$3 25	$3 25	$3 75	$3 00
Wilkesbarre	3 00	3 25	3 25	3 25	3 75	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f.o.b. at Phila.	$5 25
Lemon " "	5 00
Cumberland C. & I. Co.'s on board N. Y.	7 5.
Central C. & M. Co.'s " "	7 50
Consolidated Coal Co.'s " "	7 50

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at N. Y.	— —	— —	— —	— —	— —	— —
Lackawana at Weh'kn.	4 65	4 70	4 80	5 00	5 40	4 60
Wilk'b're at Hoboken.	4 75	4 75	4 75	4 75	5 25	4 50
Old Co. Lehigh at Pt. Johnston	5 50	5 00	5 00	5 00	5 25	4 50
Lehigh at E. Port	5 25	5 00	5 00	5 00	5 25	4 50

For freights to different points, see "Freights."

Prices of Foreign Coals.

February, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 50@— —
" Cannel	13 00 @14 00
" House	14 .0@17 50
" Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@18 00
" " Cannel, "	19 00@22 00

Per ton 2,000 lbs., delivered.

Prices of Gas Coals.

February, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 43 Pine st., N. Y.

Duty, $1 25.	Coarse. Gold.	Slack. Gold.
Block House	$1 75	@- 75
Gowrie	1 75	@- 75
Lingan	1 75	@- 75
Sydney	2 13¾	@- 71¼
Pictou	2 13¾	@1 1.¾
Little Glace Bay	1 50	@1 00
Caledonia	1 50	@- 75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co	— —	@- —
Despard Coal Co	$8 50	@8 00
Penn	— —	@- —
Newburg Orrel Gas	8 50	@8 00
West Fairmount Gas Coal	— —	@8 00

AT PHILADELPHIA.

Powelton	$7 80

Prices at Baltimore—Feb. 1870.

Corrected Weekly by Edw. Staler, Jr., Baltimore, Md.
Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$6 40@6 65
Pittston and Plymouth	6 00@6 50
Shamokin Red or White Ash	6 00@6 25
Lykens Valley Red Ash	— —@6 50
Trevorton, Red Ash	6 00@6 50
By retail, per ton of 2240 lbs. delivered	7 25@8 75
Georges Creek & Cumberland f. o. b. at Locust Point for shipping	— —@5 00
West Fairmount Gas f. o. b.	— —@6 00

Prices at Georget'n, D.C., & Alexandria, Va.

February, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 75

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Yebra Valley	— —@— —

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	$2 00

From Port Carbon, 8 cents per ton more.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 19
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 35

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R.	1 28
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 34

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 4.

Freights.—FEBRUARY, 1870.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnston	From Newburg	From Rondout
Stamford	$2 00	$1 10	$	$
Norwalk	2 25	1 00		
Bridgeport	2 00	1 00		
New Haven	2 25	1 00		
Hartford	2 75	1 50		
New London	2 00	1 25		
Norwich and Sou.	2 00	1 40		
Mystic	2 00	1 40		
Stonington	2 00	1 40		
Sag Harbor	2 00	1 40		
Bristol	2 00	1 40		
Newport	2 00	1 40		
Fall River	2 00	1 40		
Providence	2 00	1 40		
Dighton	— —	— —		
Warren	— —	— —		
Pawtucket	2 25	— —		
New Bedford	2 25	1 40		
East Cambridge	3 00	2 00		
Salem	3 00	2 00		
Newburyport	3 10	2 00		
Portsmouth, N. H.	3 35	2 15		
Rockport	— —	— —		
Saco	3 00	2 25		
Portland	3 00	2 00		
Bangor	3 00	— —		
Bath	3 00	2 00		
Middletown	— —	1 50		
Amesbury	3 25	— —		
Boston	3 00	2 00		
Cambridgeport	3 00	2 00		
Taunton	3 10	2 00		
Derby	2 00	— —		
New York	1 75	50		
Hackensack	1 95	— —		
Jersey City	1 75	50		
TO RIVER PORTS.				
Troy	— —	— —		
Albany	— —	— —		
Coeyman's	— —	— —		
Stuyvesant	— —	— —		
Cocksackie	— —	— —		
Hudson	— —	— —		
Catskill	— —	— —		
Poughkeepsie	— —	— —		
Fishkill	— —	— —		
Cold Spring	— —	— —		
Haverstraw	— —	50		
Nyack	1 60	50		
Sing Sing	1 60	— —		
Yonkers	— —	40		
New York	— —	— —		
Saugerties	— —	— —		
Rhinebeck	— —	— —		
Rondout	— —	— —		
Tarrytown	1 60	80		
West Point	— —	— —		

Foreign and Provincial Freights.

February, 1870.

Foreign.	
Newcastle and Ports on Tyne	£15@£17 keel
Liverpool	15s. —. do

TO NEW YORK.

Provincial	
Sidney	$3 25
Lingan	3 25
Cow Bay	3 25
Port Caledonia	3 25
Little Glace Bay	3 25

TO BOSTON.

Sydney	$2 75
Lingan	3 75
Cow Bay	3 25
Port Caledonia	3 00
Little Glace Bay	2 25

METALS.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band,

Hoop, and Scroll, 1¼ to 1¾ cents, ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

Pig, Scotch No. 1, ℔ ton	32 00	@31 00
Pig, American, No. 1	34 00	@35 —
Pig, American, No. 2	31 —	@34 —
Pig, American, Forge	30 —	@31 —
Bar, Refined, English and American	— —	@82 50
Bar, Swedes, assorted sizes (gold)	85 00	@97 50
Store Prices.		
Bar, Swedes, ord'y sizes, less 5 ℔ ct	120 —	@130 —
Bar, Refined " "	82 50	@ 85 —
Bar, Common " "	— —	@ 80 —
Scroll " "	110 —	@145 —
Ovals and half-round " "	105 —	@133 —
Band " "	105 —	@ — —
Horse Shoe " "	105 —	@ — —
Rods, ⅝ to 5-16 inch " "	90 —	@140 —
Hoop " "	110 —	@155 —
Nail rod, less 5 ℔ ct	— 8	@— 8½
Sheet, Russia, as to Nos. (gold)	— 11	@—12—
Sheet, Single, D. and T. Common	— 5¼	@— 7
Sheet, Galvanized	List 25@30 ℔ cent. discount.	
Rails, English (gold), ℔ ton	57 00	@— —
Rails, American, at Works in Pa	76 00	@77 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb	— 16	@— 20
English Spring (2d and 1st quality)	— 7	@— 15
English Blister (2d and 1st quality)	— 11	@— 18
English Machinery	— 11½	@— 14
English German (2d and 1st quality)	— 13	@— 15
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— 18	@— —
American, Spring, do.	— 9	@— 12
American Machinery, do.	— —	@— 12
American German, do.	— 10	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.	
Copper, New Sheathing, ℔ lb	—	@— 32
Copper Bolts	—	@— 33
Copper Braziers, 16oz. and over	—	@— 33
Copper Nails	—	38 @— —
Copper, Old Sheathing, &c., clean	—	18 @— 19
Copper, Chili Pig	—	@— —
Copper, American Ingot	—	21 @— —
Yellow Metal, New Sheating	—	@— 26
Yellow Metal Bolts	—	@— 26
Yellow Metal Nails	—	@— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb; Pipe and Sheet, 2¼ cents ℔ lb.

Galena, ℔ 100 lbs	$— —	@— —
Spanish (gold)	6 15	@6 25
German, do.	6 15	@6 15
English, do.	6 20	@6 37½
Bar (net)	— —	@ 8 00
Pipe and Sheet (net)	— —	@ 8 00

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.	
Banca	32	@ —
Straits	30½	@31
English	—	@29½

PLATES.

	Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$8 25 @8 50		$10 25 @10 75
I. C. Coke	7 00 @7 50		8 75 @ 9 50
Coke Terne	5 75 @6 00		7 25 @ 7 55
Charcoal Terne	7 37½	@7 87½	9 25 @ 9 87

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100 lb.

		Gold.	
Plates, Foreign	℔ 100 lbs.	$5 87½	@6 12½
Plates, Domestic	℔ lb.	10	@— 12

REMARKS.

IRON.—There has been no movement of moment in either Scotch or American Pig since our last, and prices are without quotable change. We have only to notice 50 tons Glengarnock at $33 50, and 150 do. Gartsherrie, from dock, on private terms. There is an active inquiry for both new and old Rails, and the market is steady at our quoted rates. The sales are 1,000 tons new English at $56 50; 1,400 do. Crashay, $57; 1,000 do. old Double-headed, to arrive, $36 75, gold; 300 do., same, on the spot, $45, currency; and 75 do. Bridge, $40. Wrought Scrap is in moderate request at steady prices, and we notice sales of 200 tons delivered at the cars at $39, cash. The demand for Bar from store continues very light, and prices are nominally unchanged. Common Sheet is steady at our quotations, as for a long time past.

TIN.—The advance in Pig noted this week is well sustained, the market still hardening under the concentration of stock. Sales have been made of 500 slabs Straits at 32 cents, and 5 tons English, 29½. Straits is generally held at 32 @ 32½ cents; English, 33; and Banca, 33½ @ 34, all gold. Plates continue active, and, with a pretty large business, prices are higher. Terne Plates, which have been neglected for some time past, now partake in the improved demand for Tin, and values also favor sellers. The transactions embrace 700 bxs. ⅛ d X Tin at $8 37½ @ $8 50; 500 do. I C Coke, 14 by 20, $7 12½; 300 do., 10 by 14, $7—now held at $7 25; 200 do. Charcoal Terne, $7 25 @ $7 75; 250 do. Coke Terne, $5 50 @ $5 75—now held at $5 75 @ $6, all gold; 500 do. and 4,000 do. I. C. Coke Tin, for future shipment, on private terms.

COPPER.—New Sheathing is steady at 32 cents, and Yellow Metal 26, net cash. The market for Ingot is dull and unsettled and prices are very irregular. Sales have been made of 100,000 lb. Lake Superior at 20⅞ cents, and 75,000 lb. do., in lots, 21⅛ @ 21¼ cents, cash.

LEAD.—The demand for Pig is limited, and though prices are without quotable change, the tendency is in buyers' favor; 75 tons Spanish on the spot, and 100 do., to arrive, sold on private terms. Bar, Pipe and Sheet are steady at 8 cents, net cash.

STEEL.—There is no change in our quotations, at which the demand from store is moderate.

SPELTER—Remains dull; 35 tons Silesian sold at 6 cents, gold.

ZINC.—American, dry, 7½c.; French, dry, 11½c.; Metallic, 10½c.

MANGANESE—5c. per lb.

Mining Stocks.

NEW YORK, Feb. 17, 1870.

Mining stocks are more active, and the advance in prices noted last week is sustained to date. Among the sales we notice 300 Central at 17c.; 200 Quartz Hill at 55c.; 500 Grass Valley at 31c.; and 100 Gregory, b 2, at $1 80.

Petroleum stocks are somewhat less firm. The following list shows a slight decline in prices:

	Bid.	*Asked.*
Bennehoff	25	35
Bergen Coal and Oil	40	—
Bliven Oil	20	—
Brevoort	1 00	—
Buchanan Farm	40	48
Central	63	70
Clinton Oil	—	3 50
Home Petroleum	—	—
National	—	—
New York and Alleghany	1 50	—
Northern Light	55	65
Pithole Creek	1 50	1 75
Rathbone Oil	25	—
Rynd Farm	31	32
Second National	—	75
Phillips	—	—
United Petroleum Farms	25	30
United States	73	78

San Francisco Stock Market.

SAN FRANCISCO, February 16, 1870.

(By Telegraph.)	*1st Board.*	*2d Board.*
Savage	38¾	—
Crown Point	16¼	18
Yellow Jacket	40¾	—
Kentucky	94	—
Chollar Potosi	20¾	—
Gould & Curry	58	—
Ophir	12¼	—
Alpha	11¾	—
Belcher	7¾	—
Imperial	38	—
Hale & Norcross	1 37	1 39
Amador	—	—

Quarterly Returns of Bullion Producing Mines in Lander Co., Nevada.

(From the Austin *Reveille*, Feb. 9.)

THE following table was compiled from the books of the County Assessor, and shows the number of tons of ore produced in Lander county, which yielded bullion during the quarter ending December 31, 1869. The table comprises the names of thirty-two sources from which bullion was obtained, while the Assessor's book specifies eighty-four; but we have omitted all lots of ore less than one ton, as well as all lots where the name of the mine or company is not given. Nearly one half the entries in the roll of the Assessor make no mention of the mine which produced the ore to which certain amounts of bullion are credited. We have called attention to this slovenly practice from quarter to quarter, but it continues and grows even worse. The fault may be divided between the reduction works and the Assessor; perhaps the county official is entitled to the larger share.

Mine or Company.	Tons.	Lbs.	Av. pr. T.
Chester	1	1898	$248 08
Doyle & Co	7	868	112 53
Kalesced	2	1814	333 02
Timoke	3	1394	155 36
Roman	1	30	194 35
Saratoga	21	1879	423 09
Silver Circle	2	1124	97 42
Blue North Star	37	556	100 70
Florida	22	432	337 25
Florida (west)	13	1096	330 71
Manhattan Co	360	962	149 15
Whitlatch Yankee Blade	8	1540	121 29
Maggie	6	918	133 04
Star of the Evening	2	846	213 10
Plymouth	2	534	192 34
Chicago	22	310	225 89
Great Eastern (dump)	3	....	171 29
Harriet Lane	14	282	337 50
Isabella	4	520	181 47
Silver Chamber	2	918	94 00
Troy (six lots)	33	1394	258 00
Lewis	3	1354	583 75
Black Ledge	1	466	316 57
CORTEZ.			
Arctic	76	27	55 66
Garrison	47	964	281 14
St. Louis	25	863	67 56
Mount Tenabo	13	1546	57 80
Berlin	9	1593	153 78
EUREKA.			
Buckeye Co	72	1450	49 08
SPRING VALLEY.			
Providence	2	984	308 48
SECRET VALLEY.			
Telegraph	1	1078	174 52
Page & Corwin	7	264	435 21

It may be stated that the entire ore product of the quarter is 993½ tons, about one half the amount produced during the previous quarter. The total value of the ore is $463,475, which gives an average of $164 42 per ton, it being understood that the computations are in gold. During the quarter the lots of ore brought to the mills were mostly small; the only considerable lot produced by any mine or company being that of the Manhattan, the average yield of which is nearly up to that of previous quarters. The only noticeable feature of the returns is the decrease in the product of ore. Our table specifies only one lot of ore produced in Spring Valley, while the Assessor mentions ten; but he gives the name of the mine from which the ore was obtained in one instance only; in nine cases it is credited to Black, Brown, or Green. This is true in a less degree of Cortez and Secret Valley. In commenting on the slipshod manner of the returns for the quarter ending September, 1869, we referred the reader to the books of the Assessor; we again refer him to those books concerning the manner of the last quarter. After he has glanced over their muddled pages he will, we think, conclude with us that the only apparent object in assessing the proceeds of the mines in Lander county, is to give, first, a per diem or commission to the Assessor and his deputies, and, second, to cast what remains into the treasury of the State and county.

In conclusion, we will observe that the returns of the Assessor contain no information respecting the product of lead bullion in the district of Eureka during the last quarter. Reports have credited that district with producing a considerable number of tons of rich lead within the past three or four months, but we have no data by which to verify them.

AFTER a series of minute investigations, it has been found that the average price of Lehigh stove coal at Elizabethport during the past ten years, was $6,69, while the average tolls paid thereon from Mauch Chunk were $2,38.

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col	P. P. Fullerton, 71 B'way	600,000	10 00		
Atlantic and Pacific	Humboldt Co., Nevada					
Bates and Baxter	Colorado			50 00		
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00		12
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	25	
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado					
Central Union Gold					15	16
Consolidated Gregory	Colorado				1 75	1 90
Combination Silver	Nevada			100 00	1 50	
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5 000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col	J. P. Davies, 19 Cliff	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		A. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 18 William	400,000			
Fisk Gold		H. Johnson, 135 Fulton	500,000			
Forest Queen		E. B. Reet, 62 B'way	1,000,000			
Golconda Gold	Sherbrooke, C. E	H. Adams, 71 Broadway	2,000,000			
Gregory	Colorado		1,250,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000,000	50 00		
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall	400,000			
Grass Valley					29	31
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000			
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col	P. P. Fullerton, 71 B'way	1,000,000		10	15
Lander Hill T. & S	Nevada	M.L.Catherwood,74 B'way	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold					1	3
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000		9¼	9⅞
Mariposa preferred	California	do. do.			20⅜	20¾
Montana Gold		G. De Cordova	400,000		2	
Montana M. L. & M. Co	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Cal	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sproull, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	500,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 19 Wall	2,000,000		12	
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M		W. H. Mailler, 108 Wall				
Ophir Gold	Comstock Lode, Nev	L. C. Warner, 70 B'way	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			20
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		52	58
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000		65	70
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00	5	10
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000			
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	1 75	1 80
Social & Steptoe Con		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Symonds Forks					45	75
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300,000			
Wauba Yuma	Arizona	J. W. Sisby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00		
Ashburton Coal Co		J. T. Rollins, 41 Pine	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine	1,000,000			
Brewster Iron		H. Robison, 165 B'way	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co		J. A. Simpson, 40 B'way	2,500,000			
Carbon Hill Coal Co		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way	2,000,000	100 00		
Clifton Iron Co		P. H. Riordan, 34 Pine	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way	5,000,000			
Crawford Coal		E. Clapp, Prest, 137 B'way	1,000,000			
Cumberland C. & I. Co		E. Kiscan, 90 B'way	5,000,000		34 25	35 50
Derby Coal Co		W. S. Davison, 11 Broad				
Dover Coal and Iron Co		L. Chase, 88 Wall				
Del. & Hudson Canal Co		R. H Nerderpol, 7 Nassau	15,000,000	100 00		
Ebervale Coal		G.L Stout, Treas., 111 Br'y	500,000			
Fall River Bituminous		D. T. Blauveit, 43 Pine	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way	500,000			
Iron Cliffs Co		C. J. Canda, 52 Wall	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way	300,000			
Kemble Coal & I. Co		R. A. Wight, 26 Ex. Place	300,000			
Keokuk Coal		J. F. Franklin, 112 B'way	100,000			
Lackawanna I. & C	Pennsylvania	E. C. Lynde, 52 Wall	1,200,000			
Lewis Run C. & I. Co		C. A. Sanborn, 80 B'way	750,000			
Lysens Val. Coal Co		F. A. Platt, 13 William	800,000			
McKean Co. Bit. Coal Co		J. H. Rolston, 80 B'way	1,500,000			
Lehigh & Susquehanna		E. W. Cark, Philadelphia, Pa			1 00	
Mahanoy			400,000	100 00		
McNeal C. & I. Co		C. C. Godwin, 71 B'way	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar	300,000			
New Boston Coal		C. H. Ogden, 55 B'way	2,000,000			
N. Y. Con. C. & I. Co		A. T. Levine, 16 Wall				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way	150,000			
Pacific Coal Co		G. Wrighton, 34 Wall				
Peekskill Iron Co		W. Murdock, 7 Nassau				
Pennsylvania Coal Co		E. H. Mead, 111 B'way	3,200,000	50 00		
Richmond Iron Co		A. M. Smith, 165 B'way	1,000,000			
Scotia Coal Co		T. S. Soper, 42 B'way	2,500,000			
Spring Mt. Coal		J. Runyon, 111 B'way	1,250,000			
Springfield & D'p Run C.		E. D. Webb, 77 Cedar	600,000			
Stout Coal Co		S. S. Comstock, 111 B'way	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way	1,000,000			
Tannerdale Coal		E. T. Ludlaw, 71 B'way	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way	420,000			
West Point Iron Co		R. C. Brock, 110 B'way	500,000			
Wilkesbarre C. & I. Co		W. H. Tillinghast, 80 Br'y	3,400,000			
Wyoming Val. Coal Co		E. Potter, 40 B'way	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1,000,000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000			
Lake Superi'r Silver Lead	Michigan	A. S. Kellogg, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P.	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st	1,000,000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Fly, 191 B'way	500,000			
Wallkill Lead, asst		S. M. Pond, 70 B'way				

MISCELLANEOUS.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Quicksilver					13⅜	13¾
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Maiden L'e	1,500,000			

The Methods of Gas Purification.

By Professor C. F. CHANDLER: A Report to the Metropolitan Board of Health.

I.

THE crude gas which is produced by the exposure of bituminous coal to a bright red heat, in clay or iron retorts, is freed, during its passage through the hydraulic main, the condenser, and the washer, from the tar which it contains, and from a portion of its water and ammoniacal compounds. It still contains, however, objectionable impurities, which must be removed by a process of purification. These are sulphuretted hydrogen, sulphide of ammonium, cyanide of ammonium, sulphocyanide of ammonium, bisulphide of carbon, certain other sulphur compounds, whose exact nature is not known, and carbonic acid. The sulphur compounds are all very objectionable; they give the gas a very offensive smell, and, when burned, produce sulphurous acid, which, if produced in any considerable quantity, would quickly render the air of a room unfit for human life, and seriously injure furniture and goods exposed to its action. These sulphur compounds must, therefore, be removed. The carbonic acid gas is objectionable only in as far as it diminishes the illuminating power of the gas when present in appreciable quantities. There is no sanitary objection to carbonic acid, for perfectly-purified gas would produce, when burned, a great many times as much carbonic acid as exists in the most impure crude gas. The presence of ammonia in gas in appreciable quantities is objectionable, but as all the methods of purification at present used remove the compounds of ammonia very effectually, we may confine the discussion to the sulphur compounds and the carbonic acid. There are four methods of purifying gas now in use:

1. *The Wet Lime Process.*—This process involves passing the gas through milk of lime. It is the oldest process in use, and is very effective in removing both the sulphur compounds and the carbonic acid. It has been generally abandoned, however, on account of the difficulty of disposing of the foul milk of lime, called "blue billy." Occurring as a liquid, the blue billy is not easily transported, and, as it does not rapidly undergo oxidation, it is not well adapted for use as a fertilizer. Running it into rivers and streams has been forbidden by law, as the pollution of the waters by it was intolerable, while the extremely offensive smell which it emits makes it impossible to store it until it becomes dry enough for transportation.

2. *The Dry Lime Process.*—In this process dry or slightly-moist hydrate of lime is placed on trays, or iron boxes, through which the gas is made to pass. This process is very effective, and has very generally superseded the wet lime process. It removes the sulphur compounds and the carbonic acid equally well. When the foul lime is removed, however, it evolves the same odor which caused the wet lime process to be abandoned. When exposed to the air it rapidly undergoes oxidation, becoming heated in consequence. During this process it evolves sulphide of ammonium, and other compounds, whose exact nature is not known, but whose odor is extremely offensive. This is the cause of the "gas nuisance," so loudly complained of a few years ago, when all the New York companies employed this process of purification. After the oxidation of the foul lime is completed, it ceases to be specially offensive, the peculiar stench being evolved during the first hour or two of exposure. The offensiveness of this foul lime became such a constant cause of complaint in the large cities of Europe, that the gas companies were compelled to abandon the process, as they had previously abandoned the wet lime. A system of ventilating the foul lime has been invented, and is now in use at both the stations of the Manhattan Company in this city, which effects its oxidation in such a manner that the offensive gases evolved are not permitted to escape into the atmosphere, but are passed through a washing apparatus, and finally through a special purifier, by which they are rendered comparatively inoffensive. This invention seems to obviate the nuisance of dry lime purification.

3. *The Laming Process.*—In 1849, Mr. LAMING introduced the hydrated sesquioxide of iron as a substitute for lime for purifying gas, preparing it of a suitable quality by mixing copperas (sulphate of iron) with slacked lime and sawdust, and exposing the mixture to the air to oxidize the protoxide of iron to the sesquioxide. The resulting mixture contains hydrated sesquioxide of iron, sulphate of lime, and sawdust. When an excess of hydrate of lime is employed, the resulting mixture contains this substance also. This material is very effective in removing the sulphur compounds from the gas. There is, however, some difference of opinion as to the completeness with which the carbonic acid is removed, due, perhaps, to variations in the proportions of the ingredients. Two important advantages attend the use of this mixture; first, when fouled it does not evolve offensive odors on exposure to the air; second, by exposure to air the sesquioxide of iron, which has been changed to sulphide of iron in the purifier, is regenerated, the sulphur being liberated and sesquioxide of iron again formed. The mixture may, therefore, be used again and again, till it becomes so clogged with the sulphur liberated, that it does not act promptly on the gas. It is then found to contain from forty to sixty per cent. of sulphur, and may be used for the manufacture of sulphuric acid. I have seen mixtures which had been in use twelve months.

4. *The Iron Ore Process.*—A few months after LAMING introduced the artificial hydrated sesquioxide of iron in France, Mr. J. M. HILLS applied the natural hydrated sesquioxide of iron, or "bog iron ore," in England. This material, like the LAMING mixture, may be used again and again, and does not evolve offensive odors when exposed to the air. A modification of this process is now used by the New York Gas Light Company of this city. It was invented by Messrs. ST. JOHN and CARTWRIGHT, and has been in use nearly two years, giving entire satisfaction. As the bog iron ores of this neighborhood are not sufficiently pulverulent to act promptly on the gas, Messrs. ST. JOHN and CARTWRIGHT add to the ore a quantity of iron borings or turnings, which they then convert into an artificial hydrated sesquioxide of iron by moistening the whole with ammoniacal liquor and exposing it to the air. The resulting mixture of natural and artificial oxide receives an addition of coarsely pulverized charcoal. This mixture is always sprinkled with ammoniacal water before it is placed in the purifier. The material now in daily use at the works of the New York Gas Light Company was introduced in April, 1868. Occasional additions of iron borings have been made to it; otherwise the material is the same. When last tested it contained thirty per cent. of sulphur. In Germany several varieties of sesquioxide of iron are now in use, prominent among which are "the Oberuseler mixture," an iron ore containing some oxide of manganese; the "Manheim oxide," and "Deicke's oxide," very pure artificial oxides of iron.

EXTENT TO WHICH THE DIFFERENT METHODS OF PURIFICATION ARE EMPLOYED.

The wet lime method has been almost entirely abandoned. The only works at which I know it to be used at present are at Cork, in Ireland. These works are of moderate size, and are situated out of the city. Moreover, the gas is freed from ammonia, by means of sulphuric acid, before it comes in contact with the lime. The foul lime does not, therefore, evolve sulphide of ammonium when exposed to the air. The dry lime process, though still in general use in this country, has been almost universally abandoned in Europe. Abandoned, first, because the foul lime was an intolerable nuisance; second, because the process is too expensive, as the lime can be used but once, and when exhausted has but a trifling value as a fertilizer.

The Laming mixture is now used in many of the European gas works. All the gas suppled to Paris is purified by this material. The German gas engineers have found that this mixture owes its efficacy entirely to the oxide of iron which it contains, and that the sulphate and hydrate of lime present do not take any appreciable part in the purification. Hence they are abandoning this mixture for the natural or artificial oxides of iron, which are cheaper and more efficient.

The iron ore method is now most generally used in Europe, and has obtained a foothold in this country, being used by the New York Gas Light Company in this city, as already described, and by two or three companies in Massachusetts. All the Liverpool gas, much, if not all, of the London gas, and that of most of the German cities, is now purified either by iron ore or one of the artificial oxides of iron. As my statements with regard to the general use of iron in place of lime were called in question during the hearing before the Board of Health, I will state that they were fully confirmed by my observations in Europe during the past summer, and will quote two or three unimpeachable authorities. Dr. SCHILLING, director of the gas works at Munich, and editor of the *Journal für Gasbeleuchtung*, says on page 247 of that journal for 1868: "Iron purification is now in general use." Mr. A. BUHE, who was one of the chemists employed by the German Gas Association, to investigate the whole subject of gas purification, says in the above mentioned journal for 1868, page 327 *et sequitur*: "gas engineers have sought by various means, especially by lime, to remove the carbonic acid from gas; but these have been generally abandoned on account of the cost and the numerous disadvantages which attended their use." * * * * "Purification by lime is hardly in use at the present time." Mr. G. R. HISLOP, engineer and manager of the Paisley Gas Works, and President of the North British Association of Gas Managers, stated in his address at Glasgow, July 28, 1869: "Purification by lime in London and elsewhere has now become inadmissible; in such places oxide of iron is employed as the purifying agent." (*Journal of Gas Lighting*, 1869, p. 695.)

[TO BE CONTINUED.]

The Cornish Divining Rod.

TO THE EDITOR—Sir: The practice of searching for mineral veins with a rod of witch-hazel has been in use in Cornwall from time immemorial; and though firmly believed in by the the miners, has been generally considered a delusion by scientific men. Yet, though no cause has been assigned for the alleged attraction of the rod by metallic substances, we should by no means consider the idea entertained by a large body of practical men for many centuries as altogether a mistaken one. My attention has been recently directed to the subject, which had been often mentioned to me by Cornish miners, by a practice of somewhat the same nature among the dwellers on the plains west of the Mississippi, where water is scarce, and it is consequently of great importance to find a point where it may be obtained at a small depth from the surface. Exactly the same method is adopted to test its proximity as that used in Cornwall with regard to metals. Having been satisfied by personal experience that such attraction exists, I suggest that scientific men should turn their attention to the phenomenon which they can verify for themselves with but little trouble. Fresh-cut beach and birch are the woods best suited for this purpose, but any hard wood will answer. Take a branch about half an inch thick, and forked on the upper end, the forks being of as nearly equal thickness as may be; cut the main stem across in a slanting direction, from three to six inches below the fork, and trim off the ends of the branches of the fork, so that they will be about one foot or eighteen inches long. Catch the end of one branch in each hand, and draw out the two branches into a straight line at right angles to the main stem, as nearly as may be, without breaking the fork, and so that the main stem stands out straight, horizontally, from the person holding it. Holding it so, grasping it tightly, say a foot above the level of a brook—raise it to the level of the breast, and repeat the operation a few times. It will be observed that the main stem, which at first stood out horizontally, has turned to a nearly perpendicular direction towards the water with such force that on loosing the ends they will be found to twist through the arc described by the main stem in passing from a horizontal to a perpendicular position, proving that some extraneous force has acted in twisting round the twig. This effect seems to be more powerful in the hands of some people than of others, seeming to prove that some nervous or other vital force enters into the problem. We know by well-established observation, that more rain falls in wooded countries than treeless ones. It may be answered that the growth of trees is a result of the rainfall, not the reverse—in other words, that the cause is mistaken for the effect. This may be true in some instances; but we know that in Egypt rain formerly fell but a few times in a century; yet since one of the Viceroys planted some millions of trees, showers have been frequent in the neighborhood of the young forest. And another striking example of the influence of trees in attracting rain is afforded by the same phenomenon caused by the abundant vegetation which has grown up in the neighborhood of Ismailia, on the Suez Canal, in the heart of the desert, since the water supplied by the Sweetwater Canal enables irrigation to be used. May not the attraction of the water for the twig, and of the vegetation for the watery vapors of the atmosphere, be due to one and the same cause? And again, may not the attraction between metallic deposits and the switch be the result of a like cause? No scientific inquiry, that I know of, has been made into this interesting subject. Proper investigation might lead to important practical discoveries. No means exist of changing the natural climate of a country, except through the growth or destruction of its forests; and this suffices to explain the great importance of the subject. Could forests be raised on the great plains west of the Mississippi, their climate would probably be materially altered, and a greater rainfall would take place—a most desirable consummation, could such be brought about. The prevalent drought is the main cause of the uselessness, for agricultural purposes, of the vastly greater proportion of that district.

For mining operations, the invention of some instrument like the magnetic compass, which would indicate its approach to metallic veins, would be of the highest value. Every one who has been practically engaged in mining, knows the difficulty generally experienced in tracing veins. In fact, it is only when the vein is very wide, and the "back," or outcrop, rises above the surface, (as is sometimes the case in the widest and most powerful lodes), or else when the hill or mountain is bare of soil, that we can trace the vein. Generally speaking, large sums must be spent in cutting trenches and making excavations before finding a lode. And even then, nine-tenths of the veins so found are worthless. Could an instrument be invented which would not only indicate the position of a mineral deposit, but also give an idea of the amount of metallic matter in it, by a greater or lesser attraction, it would be a still further aid, and would save hundreds of millions of money, expended under the present system at haphazard.

D. C.

Scranton, Pa.

Oliver's Patent Powder and Powder Mills.

THIS inventor claims that his powder is stronger than the ordinary powder—that it makes very little smoke, and is inexplosive when not confined. He also claims, what is of inestimable value to the manufacturer, that he can make his powder without danger of explosion, and at an original cost of machinery far less than is required by the present process of manufacture.

One item of considerable expense in the manufacture of powder is the cost of handling the material, requiring a large amount of labor. This Mr. OLIVER obviates very materially by his improved machinery, which embraces several patents; and undoubtedly he has reduced the manufacture of powder by this means to the simplest, cheapest, and quickest process possible. Mr. OLIVER deals with the material of which the powder is composed in small quantities at a time, thus making only a little at a time, but making all the time. The quantity he can make depends entirely upon the size of his powder mills. Thus a large mill can make six hundred kegs in ten hours; and to manufacture this quantity only five men are required. The mill and its attendant machinery mixes, manufactures, grains, sifts the powder, and turns it out ready for the dry-house. Small portable mills can readily make from thirty to forty kegs per day; and in this point the new method exceeds the old one materially in usefulness to the manufacturer, since the latter can transport his portable mills to any point where work of any magnitude, such as handling, is to be done, and thus manufacture the powder on the spot. By this means the very heavy cost and charges of transporting and handling powder to such points may be avoided; and the article can be furnished at a lower rate—a matter of considerable interest and importance to engineers and contractors.

Among the many new explosives which have been brought to public notice within the last four years, Mr. OLIVER's powder, and improved mode of manufacture, possesses the merit of having come into practical use. An experience of six months at least in its manufacture enables him to substantiate his claims by actual tests at his mill near Wilkesbarre, Pennsylvania, where the powder is made and extensively used. It is said that, under the present ordinary system of manufacture, a mill producing, say at the rate of two hundred kegs per day, (twenty-four hours), has on the average an explosion every six months. These explosions take place either in one or other of the cylinders, under one of the chasers, or at some point near or at the dry-houses; and they are, of course, more or less disastrous, according to the quantity of powder at the point of explosion at the time. These accidents, as is well known, are frequently attended with loss of life, and rarely fail to inflict, at least, serious injury upon some of the persons employed.

If, therefore, by Mr. OLIVER's method of manufacture as good and as cheap a powder can be made as that we are now using, without these horrible risks and catastrophes, it presents claims which cannot be overlooked by our large manufacturers engaged in this very hazardous business.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.*]

*The Drainage of the Haarlem Lake, in Holland..... 113
Polytechnic Club of the American Institute..... 114
On the Elevation and Subsidence of Continents..... 114
Drying Timber by Steam..... 114
A New Process for the Extraction of Copper from its Ores..... 115
MINING SUMMARY..... 116
MARKET REVIEW..... 118
Mining Companies and Stock Quotations..... 119
The Methods of Gas Purification. 120
The Cornish Divining Rod..... 120
Oliver's Patent Powder and Powder Mills..... 120
EDITORIALS:
Humid Copper Processes..... 121
The Designing of Ships..... 121
Time in Geology..... 121
The Chalmers-Spence Boiler-Covering..... 121
The Purification of Gas..... 121
Sale of a Quarry..... 121
The Oldest Spot on the Globe.... 122
Switching-Engines with Water-Tanks..... 122
Tempering Steel..... 122
ADVERTISEMENTS..... 122

ROSSITER W. RAYMOND, Ph. D., Editor.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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Humid Copper Processes.

THE new process for treating copper ores invented by Dr. STERRY HUNT, and about to be employed by Mr. JAS. DOUGLAS, Jr., at the Harvey Hill mine, near Quebec, is described in another column. We shall here briefly call attention to its distinguishing features.

The ordinary process for the manufacture of cement copper consists in the solution of the copper compounds, generally by means of acids, and the precipitation of the metallic copper by the addition of iron. This method is open to two objections. One is the waste of iron, resulting from the fact that of the iron added, a part remains in solution without precipitating any copper, and another part is itself precipitated with the copper. The other objection is the contamination of the product, arising from this precipitation of a portion of the iron with it.

The equivalent of copper being 31.7, while that of iron is only 28, the precipitation of 31.7 parts of copper should, theoretically, be effected by the substitution of 28 parts of iron; or, in other words, for every 100 lbs. of copper produced, but 88.3 lbs. of iron should be consumed. In practice, however, owing to the above causes, from 200 to 300 lbs. of metallic iron are consumed, from 30 to 60 lbs. of which are a positive injury, since they are mixed with the copper precipitate.

The ingenious process of Messrs. HUNT and DOUGLAS obviates these objections, by a change in the method of effecting a solution. The preliminary roasting of sulphuretted ores, and the final precipitation with metallic iron, are the same as in the ordinary process; but the chemical reactions of the solution are widely different. The evils we have alluded to arise from the acid solutions employed, and the highly oxidized salts (persalts) of iron contained in them. The peroxide of iron, Fe_2O_3, in the bath, whether in combination with sulphuric or muriatic acid, absorb a portion of the metallic iron, and become reduced to Fe O, or protoxide forms, while a portion of the persalts falls in a basic, insoluble precipitate. These unstable persalts should, if possible, be avoided.

Again, there is a chloride of copper, called the subchloride or di-chloride, which contains twice as much copper in proportion to the chlorine as the simple chloride or protochloride. Thus the protochloride, Cu Cl, contains 47 per cent. of copper and 53 per cent of chlorine; while the dichloride contains 64 per cent. of copper, and 36 per cent. of chlorine. The ordinary precipitation substitutes iron for the copper of the protochloride, making metallic copper and protochloride of iron; but the same iron would suffice to expel two equivalents of copper from the dichloride. Thus:

$$Cu\ Cl + Fe = Cu + Fe\ Cl$$
$$Cu_2\ Cl + Fe = 2Cu + Fe\ Cl$$

It is evident, therefore, that the more dichloride of copper is present in the solution, the less iron will be required for the precipitation. The theoretical amount required for a protochloride solution is, as we have said, 88.3 parts of iron for 100 of copper; the theoretical amount for dichloride is half as much, or 44.1 parts of iron. For mixtures of the two, the proportion of iron required by theory would vary between these two limits, according to the proportions of the proto and dichloride of copper.

But this desirable dichloride of copper is insoluble in water, and in the ordinary process its presence would be troublesome. The bath employed on the new process, however, permits its formation, and holds it in solution. This bath is a solution of neutral protochloride of iron, with a certain proportion of salt. The former acts upon the oxidized copper, producing a mixture of dichloride and protochloride, and precipitating at once peroxide of iron. The salt holds the copper salts in solution, and the liquid is drawn off from the insoluble residuum. From this liquid, by the addition of metallic iron, the copper is precipitated. By this means all absorption or precipitation of iron in the last operation is avoided, and, at the same time, the theoretically necessary quantity is reduced, since a large portion of the copper—about two-thirds—is dichloride. It is found easy in practice to produce 100 lbs. of pure cement copper by the use of about 60 lbs. of iron.

Further explanations of the process, from the pen of Dr. HUNT, will be published next week, when we shall take occasion to add some remarks on its possible and promising applications. Meanwhile, we await with interest the reports of the operations at Harvey Hill, which have just been inaugurated, and also those of the large establishment near Liverpool, England, where it is to be employed upon Spanish ores.

The Designing of Ships.

As there is now some prospect of our being able to construct iron steamships in this country for ocean traffic, it is appropriate that we should examine the subject of the general character of the model to be followed, that we may obtain that which shall be the most economical, durable, and sea-worthy. To do this, it is necessary to consider the general principles which govern the naval architect in his design.

A ship may be described as a vehicle for carrying weight upon the water, and the object of a naval architect should be so to design a ship that, with a given displacement, it shall carry the greatest weight at the least expense. The merit of his work in this respect is measured by the profit the vessel brings her owners. He must, therefore, construct his hull in such a manner that it shall have no more weight than is absolutely essential to strength and durability, since every pound in her hull lessens the *paying load* his vessel can carry.

To build an economical steamer, then, he must select such a model as will give the least resistance proportionate to the displacement in its passage through the water; for increase in resistance means increase in weight of machinery and of fuel to be carried. He must also select those materials which shall give the greatest strength and durability with the least weight, and which shall occupy the least room within the skin of the hull; since space to stow a cargo is as valuable as the ability to carry it.

That iron gives these two results—greatest strength for the weight and the space occupied—is the reason why iron ships are driving wooden vessels from the ocean. An iron ship weighing about twenty per cent. less than a wooden one of the same displacement, and the sides of the iron vessel being but one-half as thick.

In calculating the strength of the vessel, it is customary to consider the hull as an iron beam, and hence, if the same depth is retained, the strength required increases directly as the length—that is, a vessel of a certain beam, depth, and length, will require to be made twice as strong if the length of the vessel is doubled, the same depth and beam being maintained. As strength is in this connection synonymous with weight, the latter vessel will weigh twice as much for each foot of length as the former, while her displacement per foot of length has not been increased. It therefore follows that the shorter a vessel is in proportion to her depth, the lighter she can be made.

Another object is to obtain a ship which shall, for her displacement, have the least resistance. A ship may be said to dig out for herself a canal or trough in the water, the section of which is the area of her immersed midship section, and the power required to dig this is conditioned not only by the bulk, but by the height to which the water has to be raised. As water is practically incompressible, every atom displaced requires an atom to be raised above the level of the water; and the greater the height of the column, the greater the power required to raise it.

It is, therefore, desirable to obtain the necessary displacement by increasing the beam, rather than by increasing the draught. The object of fine lines forward and aft is merely for the purpose of gradually and easily raising the water to the surface and bringing it back again. The length of these lines before and abaft the middle body is dependent upon the breadth of beam and the speed required. A ratio of one-fifth between the breadth and the length is ample for this purpose.

There is also another cause of resistance which has only of late years assumed the importance it demands, and which is known among naval architects as "skin resistance;" that is to say, the resistance caused by the friction of water against the skin of the hull. This is not literally true, as there is immediately in contact with the side a film of water, which travels along with almost the same speed as the vessel; outside of this film there is another, which travels still slower; and so on until water is reached which has no forward movement whatever. It is the labor of carrying forward this water, as well as the friction, which go to make up the skin resistance. BEAUFAY found that the resistance for each square foot of surface of a smooth painted plank, at a speed of one knot per hour, is 0.01 of a pound, and that the resistance increases as the square of the speed. This, however, is only the case at the surface of the water. The deeper in the water and the greater the pressence of the head, the greater, of course, must be the pressure and consequent resistance. To obtain, then, the least skin resistance, a vessel should be so modelled as to have the least surface compatible with its displacement, and to have that surface as near the level of the water as is consistent with good lines of entrance and exit, and ease of movement in a sea way.

T.

Time in Geology.

THE interesting article of Dr. OTT, given in our present number, seems to call for some comment, beyond the praise which its clearness and felicitous presentation of theories deserve. In treating of the phenomena of elevation and subsidence of continental shores, Dr. OTT falls into the same error which he so neatly satirizes in others. Their exploded hypotheses are put aside with merited disdain; but those which he has adopted are invariably declared to be "proved beyond a doubt." Possibly some future lecturer to a future Liberal Club may administer to him the same satirical chastisement which he has bestowed on the savans—i. e., the knowing ones—of the last century.

In point of fact, the theories forcibly stated by Dr. OTT, especially in their relations to time, are not "proved beyond doubt." On the contrary, the most recent researches throw a great deal of doubt on the very class of evidence here called into Court. We refer to the arguments as to time, drawn from comparisons of fauna and flora.

A priori, it would seem illogical to infer contemporaneousness of rock-formations or sand deposits from similarity of fossils; since an agreement between the fauna or flora of different localities proves only similarity of conditions—not by any means synchronism. Observation confirms this proposition by revealing to us, at the present period, widely differing flora and fauna in different parts of the globe; and the very latest investigations—those of the deep ocean-beds, showing as they do the existence at great depths of hitherto unsuspected species, and of different fauna, side by side, in actual process of fossil deposition, are conclusive negations of the bold deductions so commonly and positively made by geologists, from the indications of marine petrifactions.

Again, nothing is less likely than uniformity of elevation or subsidence through long periods. The calculation that a coast which is now observed to rise a full three feet in a century, must have taken two thousand years to rise sixty feet, has no value whatever. And equally untrustworthy are calculations based on the assumed rate of sedimentary deposition, etc. The instance of a certain French locality, where the occurrence of human bones at a certain depth was made the argument for a vast antiquity of the race, and was subsequently robbed of much of its significance by the discovery in the same neighborhood of Roman coins, in a position which, by the same reasoning, conferred a pre-historic antiquity upon Julius Cæsar, should serve as a warning to geological mathematicians.

Sir CHARLES LYELL's demolition of the cataclysmic school was a great step in advance. It is now necessary that this beneficial impulse should not run to an equally unwarranted extreme. Let us not be in a hurry with our facts. There are plenty more of them to be found, and they will keep. Not to-day nor to-morrow shall we have gathered enough to build a universe withal.

The Chalmers-Spence Boiler Covering.

THE question of boiler covering is one of considerable interest to engineers and manufacturers. The old practice of covering with felt and canvas has been only tolerated in the absence of something better. It is so perishable, and moreover so dangerous, from its liability to catch fire, that the want of something more durable, non-combustible, and at the same time a good non-conductor, has been widely felt. The Chalmers-Spence Patent Non-Conductor seems to answer the purpose admirably. It has been in use in the British navy since 1863, chiefly on account of its safety. It cannot catch or communicate fire. It is said to preserve the iron, a considerable quantity of oil being used in its manufacture. The Hudson River Railroad Company have had the pipes in their new freight depôt in St. John's Park covered with this composition, and the steam now passes from the boilers to the engines (a distance of 1,000 feet) perfectly dry. Mr. HANCOX, the president of the New York and Troy Steamboat Company, says it is invaluable to them, keeping the boats cool near the boilers. It has been officially tested in the English dockyards and American navy-yards, where it is the only composition used for this purpose. We commend this new article to the attention of our engineering friends, and those who are interested in the matter of saving fuel and preserving their boilers.

The Purification of Gas.

WE present in another column the first part of Prof. CHANDLER's comprehensive report to the Board of Health, on this subject, so vitally important to the comfort and well-being of every citizen.

Prof. CHANDLER's conclusions in favor of the iron process are gradually being adopted by the best American chemists. Prof. WURTZ, who was at one time, we believe, not of that opinion, has recently avowed, in the columns of his own journal, his approval of the use of iron. We trust that, since the doctors now agree, the patient public may be speedily relieved. At present, we are fain to apply for succor to another chandler, who furnishes us with very unscientific tallow.

Sale of a Quarry.

THE attention of our readers is called to the sale of a soapstone quarry, with mills, machinery, etc., at Groton, Mass., on March 16th. See advertisement in another column.

A Great Soda Mine.

SOME two miles north of the Sand Springs road, and fifty miles east of Virginia and Gold Hill, is an immense and apparently inexhaustible deposit of almost pure soda. It is owned by parties in Carson and Virginia, who use it in the manufacture of soap, and also supply quartz mills with it as a chemical agent in the reduction of ores. They also supply it to drug and grocery stores, where it is sold for washing and other purposes for which common soda is ordinarily used. It is free from all earthy matter, and consists of eighty per cent. soda, the balance being salt or something of the sort. The deposit is in the midst of an alkali flat, of some seventeen acres in extent, and at the surface it appeared only about three feet wide, or rather more like a soda spring than anything else, the pure article forming in a crust over and about the strong watery solution. Upon digging beneath this, however, the solid soda was discovered in a defined mass like a quartz ledge. A shaft has been sunk beside it to the depth of fifty feet, from the bottom of which a drift has been made twenty-five feet into the vein or deposit of soda. without getting through it. In fact, very little is known of the depth or extent of this huge deposit of soda, except that there is apparently a million tons or more of it in sight. The enclosing walls on each side are very distinctly defined, and are simply composed of a dark, heavy, compact, iron sand, strongly impregnated with soda. This deposit is an singular as it is valuable, and goes to show how little the varied and inexhaustible resources of our young State are developed as yet.—*Gold Hill News.*

The Oldest Spot on the Globe.

PROFESSOR W. C KERR, State Geologist of North Carolina, makes the following statement: "Facts are sufficient to indicate that these rocks belong to the most ancient of the azoic series. The intensity of the metaphorism, the characteristic rocks and their contained minerals, together with the total absence of anything like organisms in even the least altered and latest of the series, (in Cherokee county, for example), render this conclusion inevitable. And not only do they belong to the lowest geological horizon, but the entire absence of all representatives of the later formations makes it further necessary to conclude that we have here an extensive tract of the oldest land on the globe; and as North America is the oldest born of the continents, so the Black Mountain is the oldest of the first to emerge from the face of the unbroken sphere of waters when the command went forth, 'Let the dry land appear.'"

Switching-Engines with Water-Tank Frames.

IN Great Britain and Germany there have recently been constructed a number of locomotive engines for switching purposes, whose chief peculiarity consists in their having the frames which support the boiler and machinery made of wrought-iron plates, very much on the same principal that wrought-iron box tubular bridges are made. These frames are made water-tight, and are used to carry the water required by the engine. These engines rest entirely on two small driving-wheels placed between the forward part of the fire-box and the hind part of the smoke-box, and this arrangement of the water-tanks is not only compact but useful in causing an even distribution of weight on the driving-wheels, they being extended well forward, thus balancing the weight of the fire-box. The frames fit closely to the boiler, but are so arranged as not to interfere with its being lifted out when necessary.

Tempering Steel.

GIVING the proper degree of hardness to tools is a subject of deep interest to most of our readers, so that any light that may be imparted on the subject must be of more or less importance. For tempering many kinds of tools, the steel is first hardened by heating it to a cherry red, and plunging it into cold water. Afterward the temper is drawn by moderately heating the steel again. Different degrees of hardness are required for different purposes, and the degree of heat for each of these, with the corresponding color, will be found in the annexed table:

Very pale straw color, 430°—the temper required for lancets.
A shade of darker yellow, 450°—for razors and surgical instruments.
Darker straw yellow, 470°—for penknives.
Still darker yellow, 490°—chisels for cutting iron.
A brown yellow, 500°—axes and plane-irons.
Yellow, slightly tinged with purple, 520°—table-knives and watch-springs.

ONE of the miners at the Ebervale mines in the Hazleton region was killed by an explosion of fire-damp on Wednesday afternoon of last week—in consequence of which these mines were idle for two or three days.

Nitro-Glycerine in the Mining of Iron Ores.

WE have the following from the Marquette *Mining Journal* touching the use of nitro-glycerine in the mining of iron ores in the Lake Superior region of Michigan:

"A correspondent sends an account of a remarkable blast made at the New York mine on Tuesday last, under the immediate supervision of JACOB HOUGHTON, Esq. The blast was in the tightest stope and the hardest iron ore in the district. The stope was bound on both ends forty feet across the top, and twenty-five feet at the bottom. The face of the stope was sixteen feet high. Thirty-three pounds of nitro-glycerine were immersed in two holes, each sixteen feet deep, and both holes were fired simultaneously by electricity. The whole face was thrown to the bottom. It was the cleanest shot ever made in that stope—in fact, they have never been able to throw to the bottom in the stope with sand blasts. The amount of ore thrown down, estimated by the officers of the mine, was full six hundred tons, and the shot was made at a cost of twenty-five per cent. less than it could have been made with powder, to say nothing of the better condition of the ore, a greater portion of it being broken up into sizes ready for shipment. There was also a great saving in time. Such facts as these will greatly encourage the use of nitro-glycerine in our iron mines.

THE Mauch Chunk *Times and Register* has the following upon the strike: "The men employed in the Lehigh Coal and Navigation Company's mines at Summit Hill turned out on Monday morning. In consequence, everything is idle about the schutes, and very few coal trains are passing up and down the Lehigh and Susquehanna Railroad."

MISCELLANEOUS.

80TH AUCTION SALE.

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This subject has been treated both as one of the fine arts and as a means of providing shelter for man and his works. Every improvement connected with the art of building, whether that improvement relates to beautifying the appearance, increasing the value, strength, and durability, or lessening the cost of erection, finds a legitimate place in its pages.

THE MOTORS,

Amongst the great agents in the improvement of the arts, none are more important than the Motors—steam, water, and wind. These, in all their various modifications, will receive full attention, and every improvement will be carefully noted and discussed.

SCIENCE APPLIED TO THE ARTS,

As, for example, the application of modern chemical discoveries to dyeing, of electricity to various processes, of magnetism to the examination of iron, have all received attention at the hands of the editors.

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PUBLICATIONS.

THE MINES OF THE WEST:

A REPORT TO THE

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Being a full Statistical Account of the MINERAL DEVELOPMENT OF THE PACIFIC STATES for the year 1868, with

Sixteen Illustrations,

and a Treatise on the Relation of Governments to Mining, with a delineation of the Legal and Practical Mining Systems of all Countries, from early ages to the present time. By

ROSSITER W. RAYMOND, PH.D.,

U. S. COMMISSIONER OF MINING STATISTICS.

CONTENTS:

INSTRUCTIONS FROM THE SECRETARY OF THE TREASURY.
LETTER OF THE COMMISSIONER TO THE SECRETARY.
REPORT:
PART I.—Observations of the present condition of the mining industry:
SECTION I.—*Notes on California:*
Chapter I.—The new Almaden mines.
II.—The Mother Lode of California.
III.—The quartz and placer mines of Nevada County.
IV.—Giant powder and common powder.
SECTION II.—*Notes on Nevada:*
Chapter V.—Present condition and prospects of the Comstock mines.
VI.—Ormsby, Washoe, and Churchill Counties.
VII.—Lander County.
VIII.—Nye County.
IX.—Lincoln County.
X.—Esmeralda County.
XI.—Humboldt County.
SECTION III.—*Notes on Montana:*
Chapter XII.—General geological features.
XIII.—Population, property, railroad, etc.
XIV.—Placer mines.
XV.—Quartz mines.
XVI.—Operations of the United States law.
SECTION IV—*Notes on Idaho:*
Chapter XVII.—Report of Mr. Ashburner
XVIII.—The War Eagle tunnel.
XIX.—Bullion product.
SECTION V.—*Notes on other mining fields:*
Chapter XX.—Arizona.
XXI.—Utah.
XXII.—The Isthmus of Panama.
PART II.—The relations of government to mining:
Introduction.
SECTION VI.—*Mining law.*
Chapter XXIII.—Mining and mining law among the ancients.
XXIV.—Mining law in the middle ages.
XXV.—The Spanish mining law.
XXVI.—Modern German codes.
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Circumference of a pit, how to find
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Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
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Dip of mine, how to find and lay on (plan)
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" Remarks upon
Gases, (carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan)
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
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Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
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Summary of accidents
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Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
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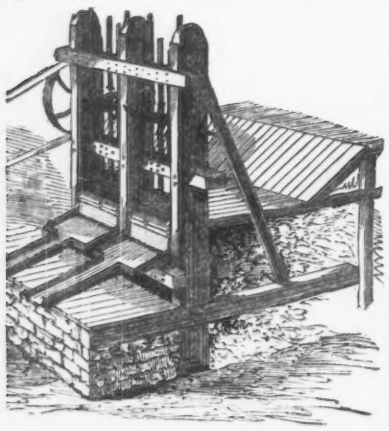

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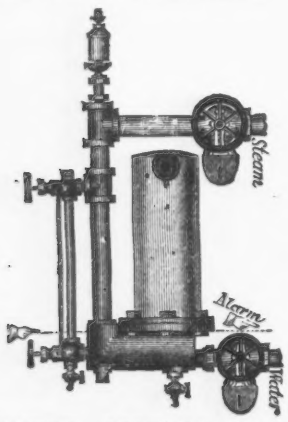

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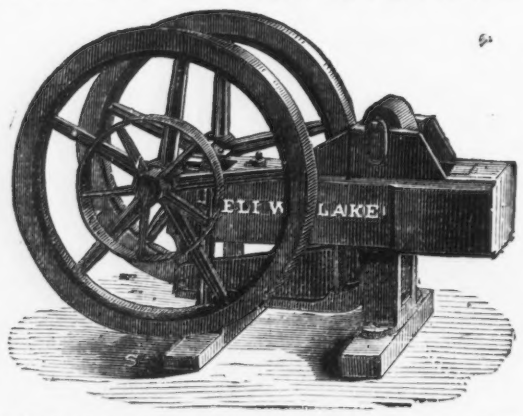

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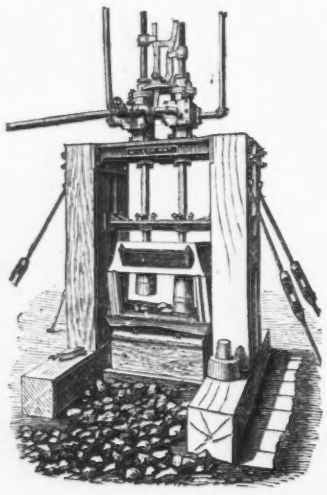

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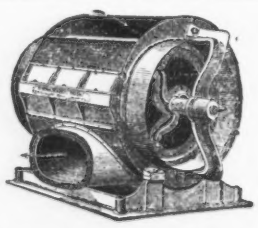

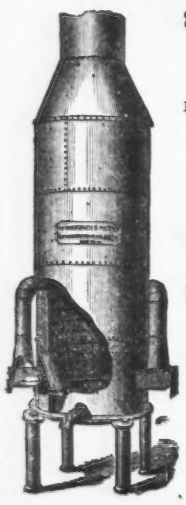

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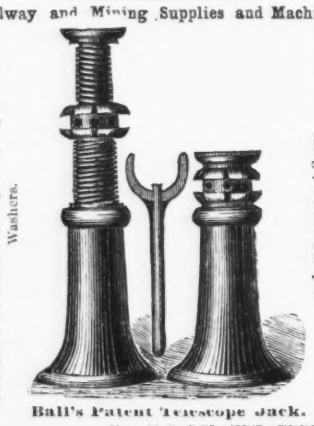

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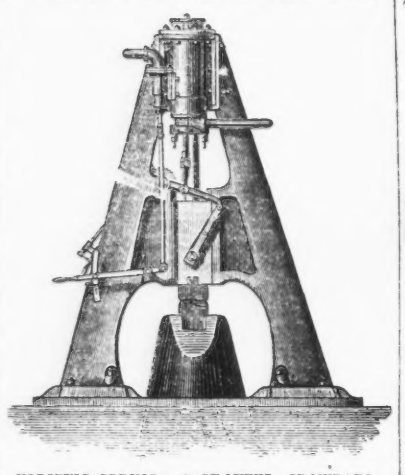

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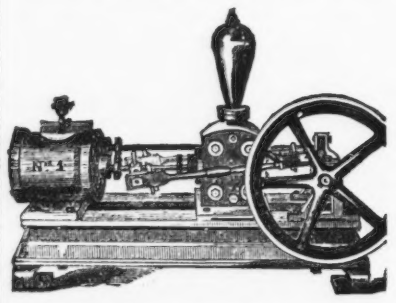

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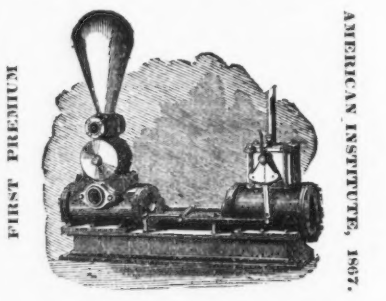

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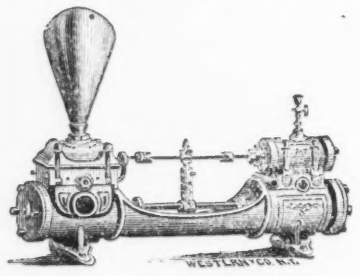

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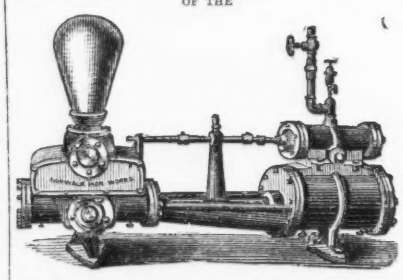

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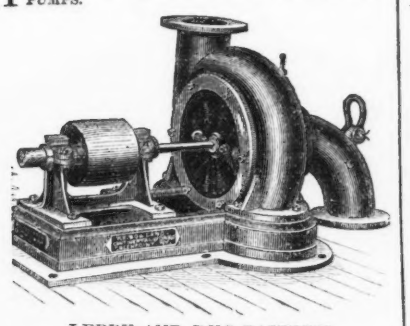

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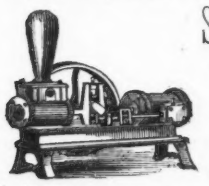

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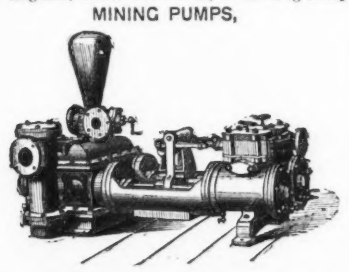

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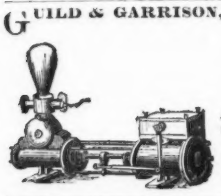

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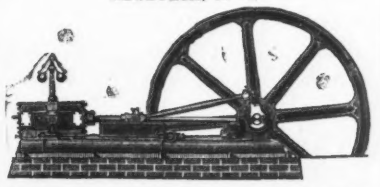

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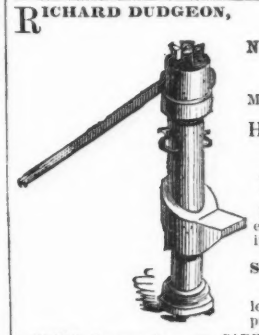

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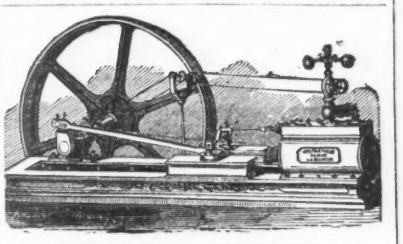

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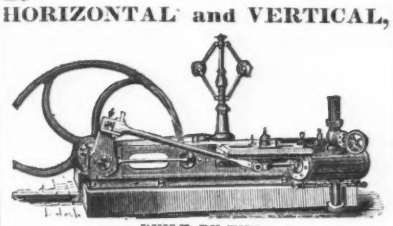

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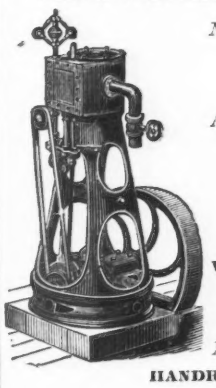

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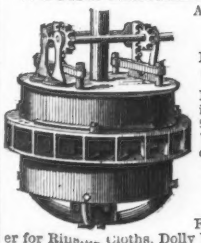

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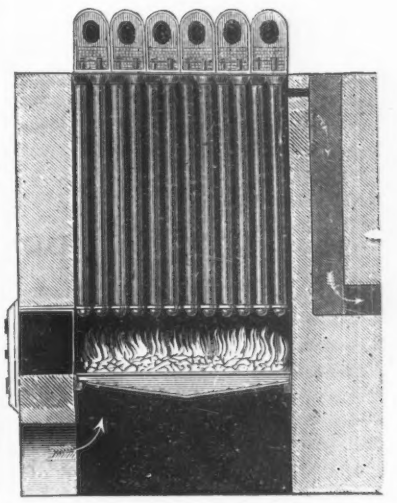

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Table of Contents of the First Half-Volume of "The Manufacturer and Builder,"

[*ILLUSTRATED ARTICLES ARE MARKED WITH AN ASTERISK.*]

JANUARY.

*Gold and Stock Telegraphy, ... 1
Persian Arms, Damask Steel, and Damaskeening, ... 2
How to cause a Tempest in a Teapot, ... 2
The Causes of the Difference in the Color of Bricks, ... 3
How to make different Cements, ... 3
Learned Blacksmiths, ... 3
*Dove-Tail Joints, ... 4
Wall-damp, ... 5
The Utilization of Tin Scraps, ... 6
The Firmness of Paper, ... 6
New City Buildings, ... 7
*Have you ever looked through a Microscope? 8
The Mechanic and his Work, ... 8
Reversible Seats, ... 9
Preventive of the Decay of Wood, ... 9
Colorado Manufactures, ... 9
Chemical Engineering, ... 10
The New Art of Fresco-Painting, 10
"Old Says" on Building, ... 11
The Progress of Building, ... 11
Chrome-Yellow Paint, ... 11
*Hints for sign-Painters, ... 12
Imitation-Marble, ... 13
Common Mortar, ... 13
New Paint for Floors, ... 13
Apatite; Its Importance in Domestic Economy, ... 14
Gun-Cotton, ... 14
The Preservation of Wood by Immersion, ... 14
Ventilation and Heating by Currents, ... 14
Ventilation and Heating by Currents, ... 15
Cement and Mortar of the Ancients, ... 15
Bridging the Missouri, ... 16
*The Park Bank Building—A Palace of Finance, ... 17
The Air in Lecture and School-Rooms, ... 18
Prize Problems, ... 19
Glass, ... 19
*Improvement in Saws, ... 20
Hoosac Tunnel, ... 21
*Deep-Sea Cables, ... 22
An Important Invention, ... 22
To the Public, ... 22
Trades' Unions in the United States, ... 23
Literary, ... 23
Mechanics' Homes, ... 24
*Long Island Villa, with Mansard Roof, ... 24
*Villa Cornice Work, ... 25
Children's Toys, ... 25
To the Press, ... 26
Occupations and Wages in California, ... 26
Queries, ... 27
Special Notice to Travellers, ... 27
Advertisements, ... 27

FEBRUARY.

*Portable Wainscoting, ... 33
Ventilation and Warming, ... 34
A Few Words about Bricks, ... 35
*The Bessemer Process and its Late Improvements, ... 35
Wire-Rope, ... 37
Hollow Walls, ... 39
Rock-Drilling Machine, ... 39
Mr. Mudge on Woolen Manufactures, ... 39
*Water-Proofing Dress Goods, ... 40
Insoluble Cements, ... 40
Atmospheric Action on Building-Stones, ... 40
*Anatomy of the Screw, ... 41
Lead Pencils, ... 41
Artificial Light and the Subject of Ventilation, ... 42
Architecture and Civilization, ... 43
Arches—Old and New, ... 43
*Manufacture of Sheet Tin, ... 44
Rates of Travel, ... 44
*Hand-Power Machine, ... 45
The History of Windows, ... 45
To Restore Burnt Cast-Steel, ... 45
To Bleach Palm-Oil, ... 45
The Building-Stone and Slate of Virginia, ... 46
The New-York Milling Interest, ... 47
*The New-City Post-Office, ... 48
Review of City Buildings, ... 50
Decay of Wood and Processes for Preserving it, ... 51
The Daguerrean Process, ... 51
To obtain Different Shades of Chrome-Yellow, ... 52
*Improved Cupola and Blower, ... 52
Literary, ... 54
Real Estate for Workingmen, ... 55
The Philosophy of Building, ... 55
*Villa and Cottage Architecture, 56
Consumption of Milk, ... 57
Trades and Professions, ... 58
Bread-Making, ... 58
Castle-Garden, ... 58
Queries, ... 59
Special Notice to Travellers, ... 59
Advertisements, ... 59

MARCH.

*Brick-Making, ... 65
Absorbent Capacity of Bricks, ... 66
Lake Colors—Their Nature and Manufacture, ... 67
*Steam-Dredging and the Suez Canal, ... 68
The Selection of Wall-Paper, ... 71
*Marble Paper Manufacture, ... 71
Sand-Grinding Machine, ... 73
*The Gothic Furnace, ... 74
Ventilation and Heating by Currents, ... 74
*The Ventilation and Warming of School-Houses, ... 75
*Iron Buildings, ... 76
Hints on Economic Building, ... 78
Copper and its Alloys, ... 79
Cryolite—Where found, Nature, and Uses, ... 80
Chrome-Orange, ... 80
*Illinois State Capitol Design, ... 80
The Uses of Gun-Cotton, ... 82
Terra Cotta, ... 82
Building-Stones—Their Preservation, ... 82

APRIL.

*Improvement in Hand-Drills, ... 97
Renovating Silk Hats, ... 97
Memoranda concerning Nails, ... 98
Comparative Weight of Pattern and Castings, ... 98
Flint-Glass, ... 98
Wolfram or Tungsten Steel, ... 99
Cheap Brick Walls, ... 99
*Stereotyping, ... 99
Edge-Tools, ... 102
Road-Dust and Vegetation, ... 102
Aniline Colors, ... 102
Soap-Making in the Olden Time, 103
*Manufacture of Vinegar, ... 104
Textile Fabrics from Glass, ... 104
The Effect of Artificial Light upon the Eyes, ... 105
*The Daguerreian Process, ... 105
Building in California, ... 105
The Piano-Forte, ... 106
The Art of Gilding, ... 106
Ventilation and Warming, ... 107
*Ventilation and Warming of School-Houses, ... 108
*The New-York Fire-Place Heater, ... 109
Cheap Houses—Building on Piśé, ... 110
*The Vermont Slate Industry, ... 83
Literary, ... 86
"Too Many Irons in the Fire," 87
The Tinning and Silvering of Looking-Glasses, ... 87
*French Sash-Windows, ... 88
*Whence came our Silks? 88
*Cottage and Villa Architecture, 89
What Shall Workingmen Read? .90
The Dwarf Builders, ... 90
Nature as a Builder, ... 91
Sharpening Files by Corrosion, .92
Queries, ... 92
Special Notices, ... 92
Advertisements, ... 92

MAY.

*The Telephone, ... 129
Peroxide of Hydrogen for the the Hair, ... 130
The Daguerrean Process, ... 130
Glue, ... 130
How to put a Cross-cut Saw in Order, ... 131
Coraline Dye—Injurious Effects Therefrom, ... 131
Mixing Things Up, ... 131
*On Boiler Explosions, ... 132
How to Repair Chain Pumps, ... 134
New Element, ... 134
*Béton Building, ... 135
Hydraulic Mortar, ... 135
Shellac for Water-Proof Coatings, Dyes, Paints, and Printing Inks, ... 136
*Improvement in Billiard Tables, ... 137
Historical Notes on Paper Manufacture, ... 137
Kalsomining Walls, ... 138
A Plea for Stone, ... 138
On Forging, Hardening, and Tempering Mill-Picks, ... 139
Chrome-Yellow Paint Practically Tested, ... 138
*Water-Closets, ... 140
Welding Copper, ... 140
The Largest Suspension Bridge, 140
*Improved Hoisting Apparatus, .141
Colored Marbles, ... 141
The Piano-Forte, ... 142
Thames Embankment—South Side, ... 142
Seaweed Charcoal, ... 142
Ventilation and Warming, ... 143
The New Metal Hydrogenium, .144
Painting Zinc, ... 144
Artificial Alizarine for Coloring, .144
Priscian a little Scratched, ... 144
Suez Canal, ... 144
*The New State Emigrant Hospital, Ward's Island, ... 145
Magenta, ... 145
Varnishes for Iron, ... 147
Ornamental Glass—Opaline and Enamel, ... 147
Ship-Building—Here and in England, ... 147
Industrial Progress, ... 147
A New Ornamental Wood, ... 148
Sprinkling Streets with Deliquescent Salts, ... 148
*Old and New Fire-Grates, ... 148
Effect of Cold upon Tin, ... 148
Cryolite as a Source of Soda, ... 149
Literary, ... 150
Credit, ... 151
On Going Surety, ... 151
Interior Decorations, ... 151
*Church Architecture, ... 152
*Ornamental Work—Ceiling and Railing, ... 153
Purifying Water, ... 154
Adulterations, ... 154
Indelible Inks, ... 154
New Cements, ... 154
Welding Steel to Iron, ... 154
Queries, ... 154
New Advertisements, etc., ... 155

JUNE.

*Improved Steam Pump, ... 161
What Paint shall we use? 162
Varnishes—their Nature and Manufacture, ... 162
Something of practical Importance in the Use of Plaster-of-Paris, ... 163
Influence of Water in the Manufacture of Wax-Leather, ... 163
Why do we Oil our Whetstones? .163
Compressed Leather, ... 163
*The Art of Electrotyping, ... 164
Practical Hints on Working and Tempering Steel, ... 166
Spiritual Photographs, ... 167
"Too Much Pork for a Shilling," 167
Credit to whom Credit, etc., ... 167
Store-Shutters, ... 168
Damp Cellars, ... 168
The Velocipede as a Mechanical Agent, ... 168
Calculating Areas by Weight, ... 168
Aniline Gray, ... 168
The Generation of Oxygen Gas from Sulphuric Acid, ... 168
*On Testing Iron by Magnetism, 169
Blowing a Wine-Glass, ... 169
How Jewelry is Made, ... 170
American Wheels, ... 170
Ventilation and Warming, ... 171
The Manufacture of Pins, ... 171
Right-Handand Left-Hand Locks? 171
Lisieux and its Linen Factories, 171
Cleaning Gilded Ware, ... 171
Encaustic Tiles, ... 172
*Salt—its Manufacture and Uses, 172
Paper Belting, ... 173
Vegetable Oils—their Production and Purification, ... 174
Chimneys and Chimney-Shafts, .174
Artificial Stone, ... 175
Plank Walls for Cottages, ... 175
New Fact in the Behavior of Iron, ... 175
Science and Art, ... 175
*The Kansas City Bridge, ... 176
Cement to resist Red Heat and Boiling Water, ... 178
Recovery of Fatty Matter from Waste Soap-Waters, ... 179
Paper Houses, ... 179
Sodium as a Substitute for Phosphorus in Lucifer Matches, ... 180
A Plea for Iron, ... 180
To Keep Nails from Rusting, ... 180
*Wrought-Iron Arch Girder Bridge, ... 181
Liquid Fuel, ... 181
New Mode of Breaking Masses of Iron, ... 181
Utilization of Street Dust, ... 181
Literary, ... 182
How to Spoil a Husband, ... 182
Chess, ... 183
A New Alloy, ... 184
*A Country or Suburban Barn, .184
A New Material for Bonnets, ... 185
*Design for a Summer House, .185
Workingmen as Students, ... 185
Eating, ... 185
The Philosophy of a Candle, ... 186
Adulterations, ... 187
Recipes for Earthern-Ware Glazing, ... 187
Hemp, ... 187
A Poor Prospect for the Year 1900, ... 187
Setting Fence-Posts, ... 187
Queries, ... 187
New Advertisements, ... 188

The above speaks for itself. In a period of six months we gave upwards of **500 COLUMNS OF MATTER,** from the pens of the best writers in the country and presented in connection therewith upwards of **150 ENGRAVINGS!** The second half volume is equal to the first half in every respect, and it is our determination, during **1870,** to even surpass all our former efforts and make the MANUFACTURER AND BUILDER **INDISPENSABLE** to every

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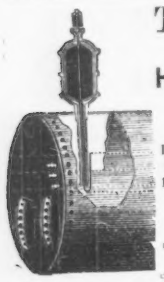

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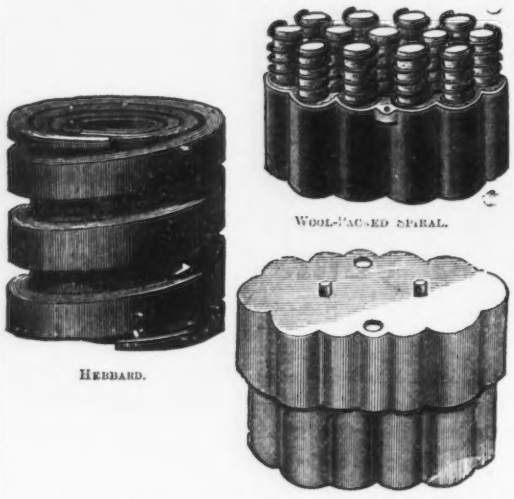

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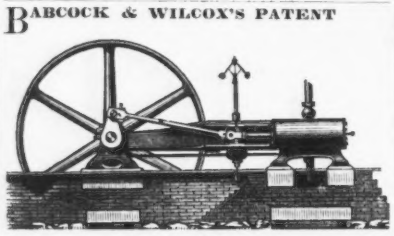

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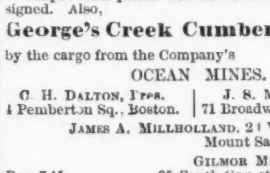

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